THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LXIV. No. 1632.] LONDON, AUGUST 21, 1894. [46TH YEAR. PRICE 6d.

GAS AND WATER PIPES

1¼ to 12 IN. BORE.

THOMAS ALLAN & SONS,

Bon Lea Foundry,

SOUTH STOCKTON-ON-TEES.

ALSO MANUFACTURERS OF
SANITARY & RAIN-WATER PIPES, HOT WATER PIPES, STABLE FITTINGS, RANGES, STOVES, And GENERAL CASTINGS.

GLASGOW OFFICE: 24, GEORGE SQUARE.
Telegrams:
"BONLEA, STOCKTON-ON-TEES."
"SPRINGBANK, GLASGOW."

— ESTABLISHED 1830. —

PARKER & LESTER,

Manufacturers & Contractors.

THE ONLY MAKERS OF

PATENT ANTIMONY PAINT,

Parker's Imperial Black Varnish,

Oxide Paints, Oils, and General Stores for Gas and Water Works.

WORKS:
ORMSIDE STREET, OLD KENT ROAD,
LONDON.

WOLSTON'S

TORBAY PAINTS

Special Quotations to Gas Companies.

DARTMOUTH, DEVON.

Lanemark Coal Co.,

LIMITED.

LANEMARK CANNEL

AND GAS COALS.

Quotations and Analysis on application to

LANEMARK COLLIERY,

NEW CUMNOCK, N.B.

Shipping Ports: All the principal Scotch Ports.

THE "C" BURNER.

NEW HIGH-POWER GAS-LIGHT.

INCANDESCENT GAS-LIGHT SYSTEM.

Consumes
3¾ cubic feet per hour.

Gives a light of
70 to 80 candle power.

Brilliant Light.

Perfectly Steady and
Noiseless.

Smokeless.

Reduced Heat.

The Ordinary Burner, with Special Globes, is suitable for Lighting Private Houses, Public Houses, Restaurants, Shops, &c.

Special Lamps constructed for Outside Lighting and Street Lighting; and Large Clusters of Lights made for Lighting Halls and large Areas from one centre.

Can be attached to any Gas-Fittings.

THE TRIUMPH OF GAS OVER ELECTRIC LIGHT.

Taking Gas at 3s. per 1000 cubic feet and Electric Light at 8d. per Board of Trade unit, the "C" Burner will produce an equal amount of light at **One-eighth the cost of Electric Light.** This cannot be disproved.

Substantial and Pushing Sole Agents wanted in each Town using Gas.

For Terms and Particulars, apply to the Manager of

THE INCANDESCENT GAS-LIGHT COMPANY, Ltd.,

14, PALMER STREET, WESTMINSTER, LONDON,

Near St. James's Park Station.

SAWER & PURVES, Garratt St. Works, MANCHESTER,

MANUFACTURERS OF

IMPROVED WET GAS-METERS IN CAST-IRON CASES,

THE UNVARYING WATER-LINE GAS-METER,

IMPROVED DRY GAS-METERS.

Speciality: PATENT CASH PREPAYMENT METERS.

CATALOGUE SENT ON APPLICATION.

THE WIGAN COAL & IRON CO., LIMTD.,

Are exclusive Owners of the well-known HAIGH HALL & KIRKLESS HALL GAS COAL COLLIERIES, and supply the Best Wigan Arley Mine Gas Coal, Gas Nuts, Gas Cannel, Cannel Nuts, &c.

MIDLAND DISTRICT OFFICE: 22, TEMPLE ST., BIRMINGHAM—SOLE AGENT: A. C. SCRIVENER.

TELEGRAPHIC ADDRESS: "WIGAN BIRMINGHAM." TELEPHONE No. 200.

LONDON DISTRICT OFFICE: 6, STRAND, LONDON—C. PARKER & SON, SOLE AGENTS.

TELEGRAPHIC ADDRESS: "PARKER LONDON."

INCLINED RETORTS,

FIRE BRICKS,

LUMPS, TILES,

BLOCKS, &c.

Special Bricks for Intense Heats.

GAS RETORTS.

CASTINGS AND EVERY REQUISITE FOR GAS-WORKS.

MOBBERLEY & PERRY,

Fire-Brick Works, STOURBRIDGE.

☞ Retort Setters sent to any part of the Kingdom.

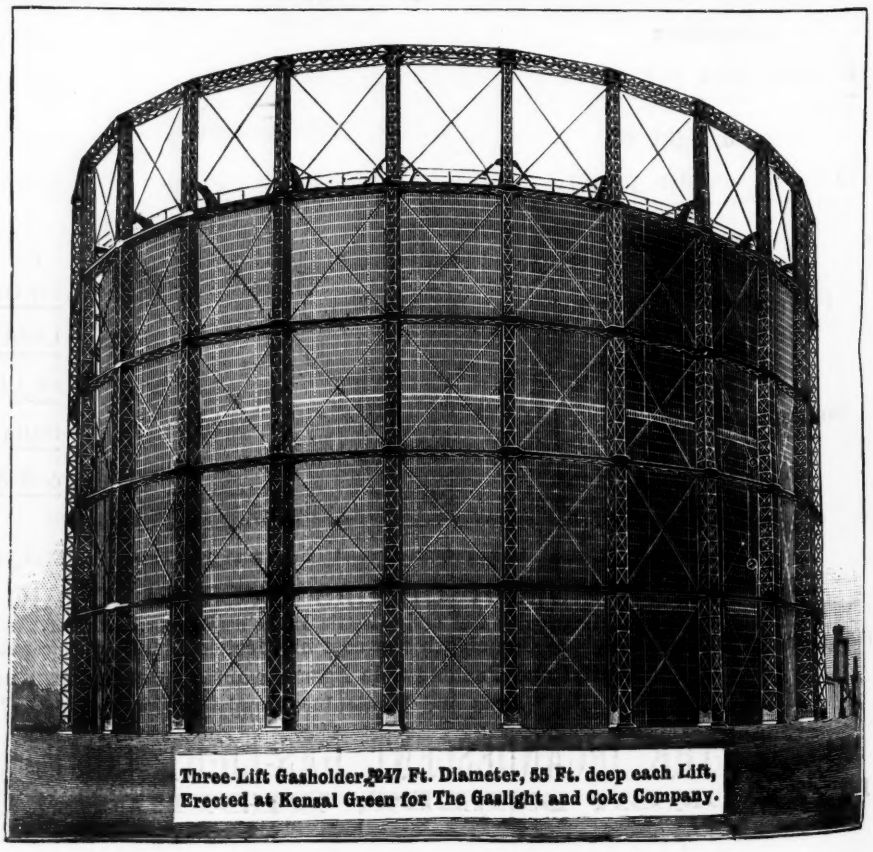
SAML. CUTLER & SONS, MILLWALL, LONDON.

NEARLY

8 MILLION

CUBIC FEET

CAPACITY.



Three-Lift Gasholder, 247 Ft. Diameter, 55 Ft. deep each Lift, Erected at Kensal Green for The Gaslight and Coke Company.

THE BARROWFIELD IRON-WORKS, LIMITED,

Late LAIDLAW, SONS, & CAINE, Limited,

GAS ENGINEERS AND CONTRACTORS,

Telegrams: "GASOMETER GLASGOW."

GLASGOW.

GAS APPARATUS OF EVERY DESCRIPTION

RETORTS, CONDENSERS, SCRUBBERS, PURIFIERS.

GASHOLDERS AND TANKS.

ENGINES, EXHAUSTERS, STEAM BOILERS AND FITTINGS.

OIL PLANT AND CHEMICAL APPARATUS.

BRIDGES, GIRDERS, WHARVES, PIERS.

ROOFING OF EVERY STYLE.

PIPES, VALVES, AND CONNECTIONS.

London Office: 6, LITTLE BUSH LANE, CANNON STREET.

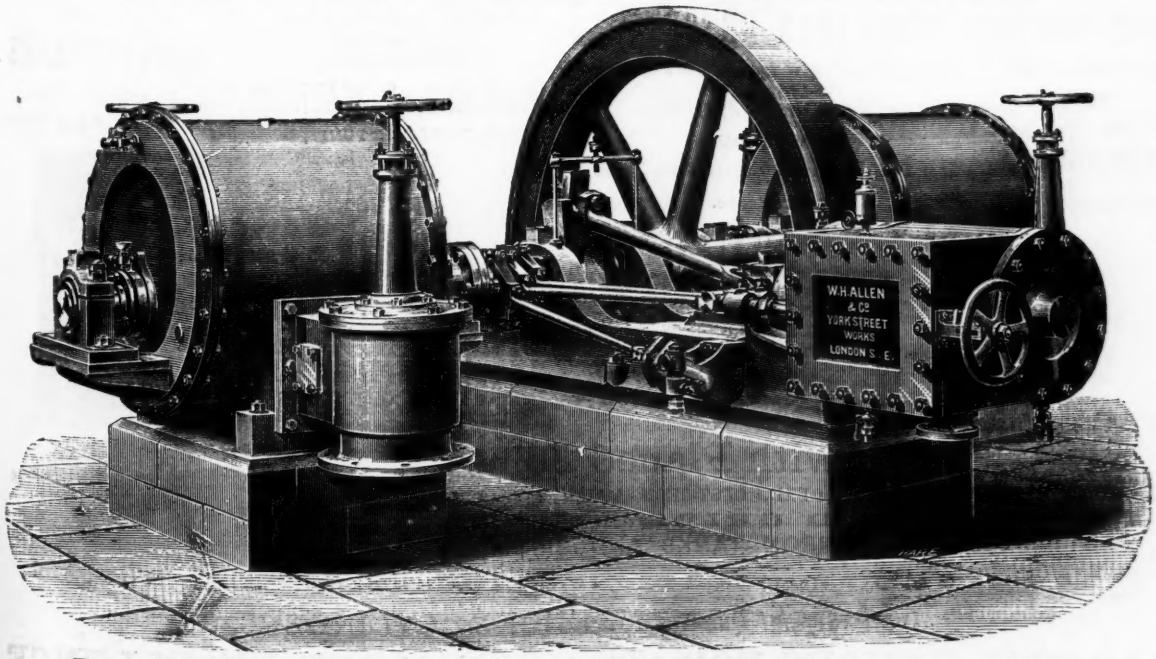
W. H. ALLEN & CO.,

York Street Works, LAMBETH, LONDON, S.E.,

MAKERS OF THE MOST IMPROVED FORM OF

GAS EXHAUSTING MACHINERY.

BEALE'S PATENT—ALLEN'S COMBINED SYSTEM.

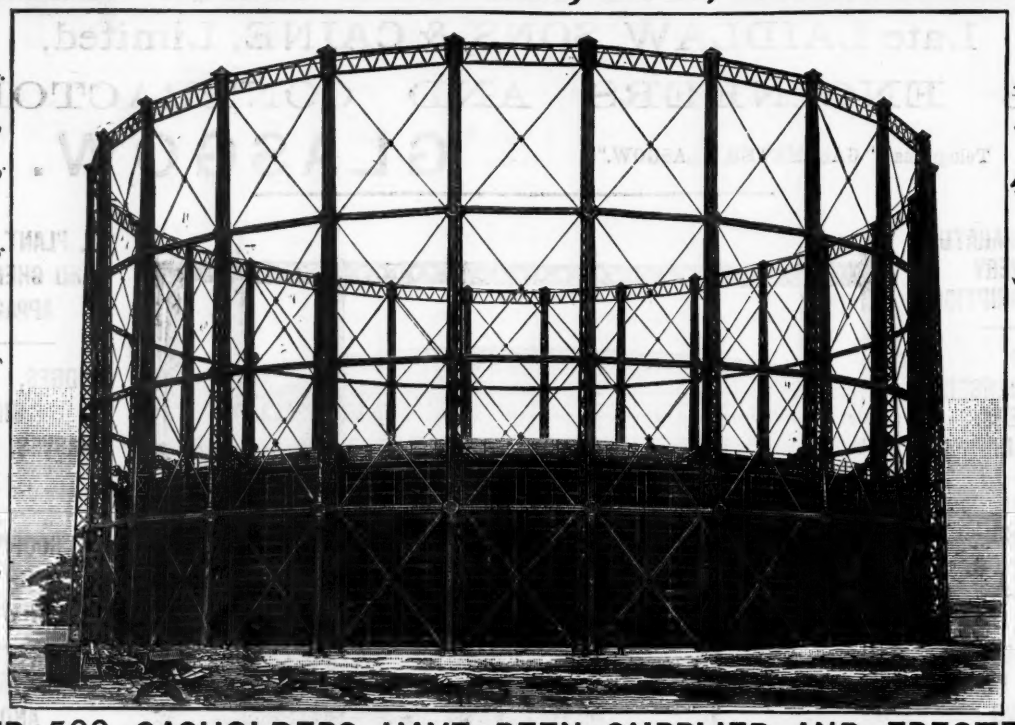


Pair of Non-Oscillating Exhausters, passing 200,000 Cubic Feet of Gas per Hour.

THOMAS PIGGOTT & CO., LTD., BIRMINGHAM.

LONDON OFFICE: ST. THOMAS APOSTLE, E.C.

GAS PLANTS, BOILERS, ENGINES, PUMPS, ROOFS, RETORT. FITTINGS, ETC.



TELEGRAPHIC ADDRESS: ATLAS, BIRMINGHAM.

WELDED & RIVETED PIPES, FOUL MAINS, RETORT. LIDS, WROT & CAST TANKS, PURIFIERS.

OVER 500 GASHOLDERS HAVE BEEN SUPPLIED AND ERECTED,

INCLUDING THOSE SUPPLIED TO THE FOLLOWING GAS COMPANIES AND CORPORATIONS:

BATH.	BOLTON.	BRISTOL.	CHELTENHAM.	LEAMINGTON.	PRESTON.	SHEFFIELD.
BELFAST.	BOMBAY.	BRISBANE.	HARTLEPOOL.	LIVERPOOL.	READING.	STOCKHOLM.
BECKTON.	BRADFORD.	CARDIFF.	LEEDS.	NOTTINGHAM.	RIO GRANDE.	SYDNEY.
BIRMINGHAM.	BRIGHTON.	COVENTRY.	LEICESTER.	OLDHAM.	SOUTH METRON	VIENNA.

GAS COAL.

BEST

REAL OLD SILKSTONE GAS COAL,

Address THE STRAFFORD COLLIERIES COMPANY,

Near BARNSLEY, SOUTH YORKSHIRE.

NEWTON, CHAMBERS, & CO., LIMITED,

THORNCLIFFE IRON-WORKS, near SHEFFIELD,

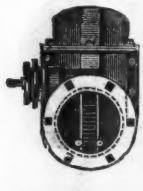
MANUFACTURERS OF

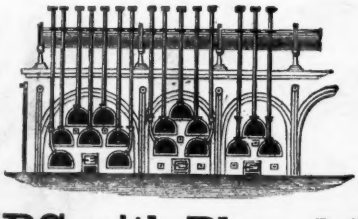
SLIDE VALVES, WITH RACK & PINION OR Internal or External SCREWS of all sizes, GASHOLDERS, AND Gasholder Tanks.

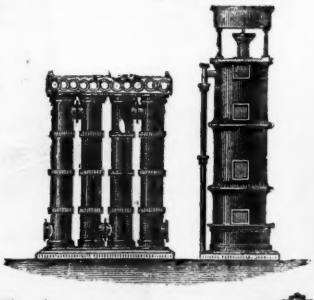
CAST-IRON RETORTS, RETORT-BED FITTINGS, *And Retort-House Appliances* of every description, Iron Roofs, Columns, Girders, Floor Plates and Tools, &c.

WROUGHT AND CAST IRON CONDENSERS, SCRUBBERS, & WASHERS, TAR AND LIQUOR PUMPS, &c.

PATENT CENTRE-VALVES for working Purifiers, Also Bye-Pass & Stop Valves.





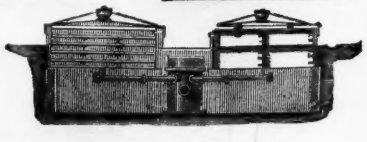


PURIFIERS with Planed Joints,

HAND and HYDRAULIC LIFTING GEAR, CAST-IRON MAINS and SPECIALS.

WOOD GRIDS.

CAST AND WROUGHT IRON TANKS AND CISTERNS.



DESIGNS, SPECIFICATIONS, AND ESTIMATES FREE.

Pig Iron (*Special Quality*) for ENGINE CYLINDERS, &c.

GAS COAL FAMOUS FOR ITS UNRIVALLED EXCELLENCE.

JOSEPH CLIFF & SONS,

INCORPORATED IN
THE LEEDS FIRE-CLAY COMPANY, Ltd.,
WORTLEY, LEEDS.

LONDON OFFICES & DEPÔTS:
Baltic Wharf, Waterloo Bridge.
WHARVES NOS. 2 & 4, INSIDE G.N. GOODS YARD, KING'S CROSS, N.
LIVERPOOL:
16, Lightbody Street.
LEEDS:
Queen Street.

MACHINE-MADE RETORTS

Have been made in large quantities for the last twelve years; and during the whole of that time, have been in regular use at most of the largest Gas-Works in the Kingdom. They possess the excellent quality of remaining as near stationary as possible under the varying conditions of their work—a quality which will be appreciated by all Gas Engineers and Managers. The generally expressed opinion is that these Retorts are the very best that are made.

RETORTS CAREFULLY PACKED FOR EXPORT.

Fire-Bricks, Lumps, Tiles, &c., &c., of every description suitable for Gas-Works.

TELEGRAPHIC ADDRESS:
"ROBUSTNESS LONDON."

GAS & WATER WORK

J. & H. ROBUS,

ENGINEERS & CONTRACTORS,
20, BUCKLERSBURY, LONDON, E.C.,

furnish Plans, Estimates, and Specifications for SINKING BOREHOLES *and* WELLS; *Erecting* RESERVOIRS, FILTER-BEDS, *and* GASHOLDER TANKS; *and* EVERY REQUISITE *for* GAS *and* WATER WORKS,

INCLUDING

MAIN LAYING

EXCHANGE TELEPHONE 1756.

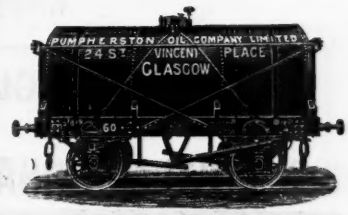
OIL GAS

BETTER TERMS CAN BE OBTAINED FROM SUPPLIERS OF OIL IF PURCHASERS HAVE THEIR OWN

TANK-WAGGONS.

HURST, NELSON, & Co., LTD.,

THE GLASGOW ROLLING STOCK AND PLANT WORKS, MOTHERWELL.
REGISTERED OFFICE:
27, ST. VINCENT PLACE, GLASGOW.



GEORGE ORME & Co.,

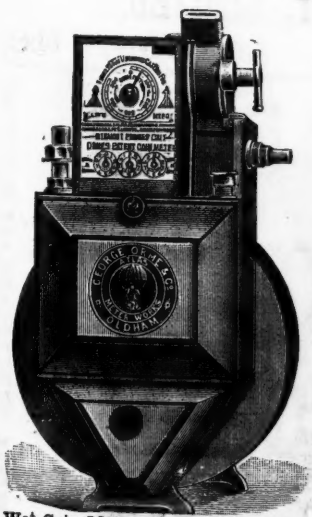
ATLAS METER WORKS, OLDHAM.

ORME'S PATENT COIN PREPAYMENT METERS.

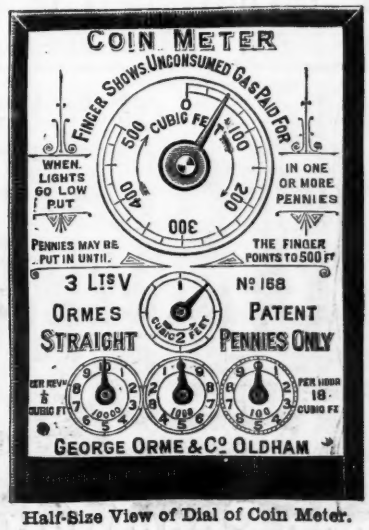
Wet Meters in Cast-Iron and Tinplate Cases. Dry Meters in Tinplate Cases.

NEW PATENTED ARRANGEMENT FOR ALTERING THE SELLING PRICE OF GAS.

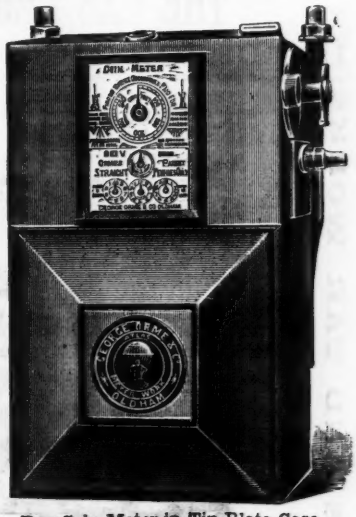
Full Particulars sent upon Application.



Wet Coin Meter in Tin-Plate Case



Half-Size View of Dial of Coin Meter.



Dry Coin Meter in Tin-Plate Case.

Telegraphic Address: "ORME, OLDHAM." A.B.C. Code (4th Edition) used. National Telephone: No. 93, Oldham.

KIRKHAM, HULETT, & CHANDLER'S,

PATENT LIMITED,

"STANDARD" WASHER-SCRUBBERS

These Machines are admittedly the most efficient of any in the Market, as evidence of which the fact is stated that 478 of them, equal to a daily capacity of 461,972,000 cubic feet of Gas, are in operation or in course of construction.

Maximum Efficiency. Minimum Wear and Tear, Back Pressure, and Power required to drive.

Machines recently erected at Beckton, Devonport, Dorking, and Accrington, and in hand for Antwerp, Silvertown, Berlin, Marlborough (U.S.A.), &c.

Sole Agents in Gt. Britain for Marshall's Patent Tar-Extractor.

3 & 4, PALACE CHAMBERS, BRIDGE STREET, WESTMINSTER, S.W.

IMPORTANT TO GAS COMPANIES.

THE MAXIM CARBURETTOR,

FOR ENRICHING GAS IN BULK.

Used for the last Three Years by all the principal London Gas Companies, and since adopted by numerous Suburban and Provincial Companies and Corporations.

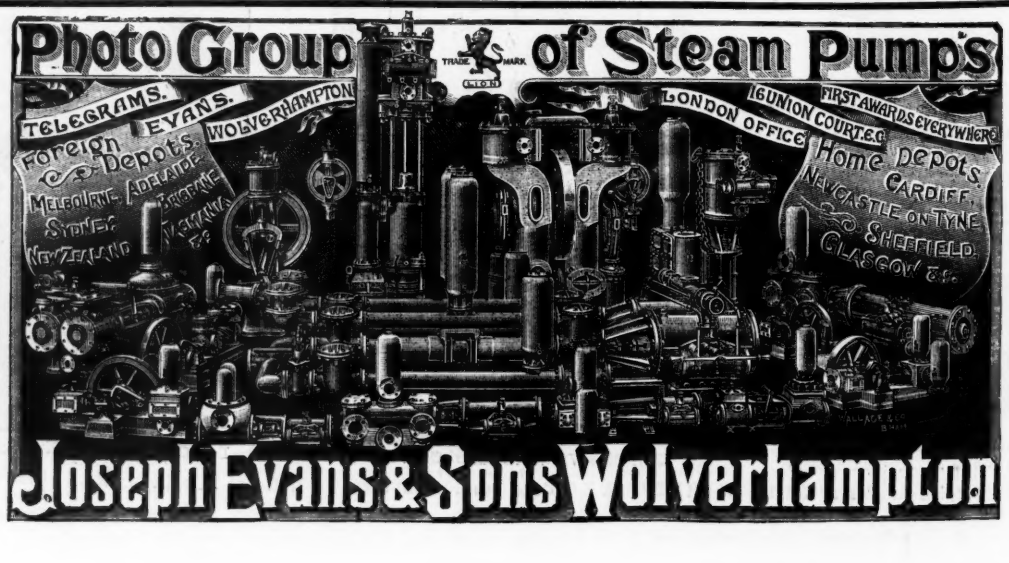
THE CARBURETTOR is INEXPENSIVE, EASILY FIXED, and ENTIRELY SUPERSEDES the use of CANNEL COAL.

FOR PRICES AND FULL PARTICULARS, APPLY TO

THE GAS LIGHTING IMPROVEMENT COMPANY, LIMITED,

18, DEVONSHIRE STREET, BISHOPSGATE, LONDON, E.C.

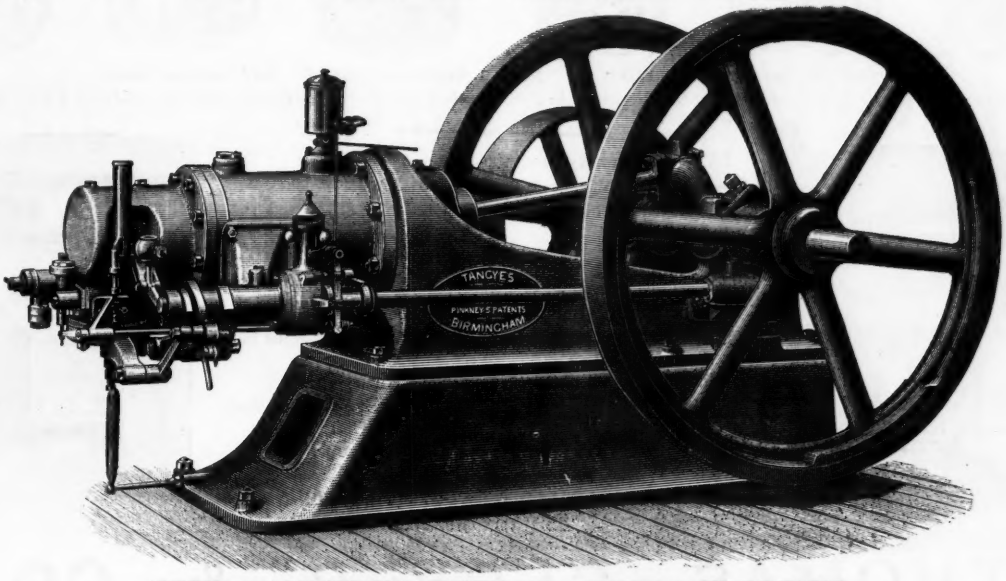
GAS AND TAR WORKS PUMPS A SPECIALITY.



WATER-WORKS PLANT A SPECIALITY. Apply for No. 8 Catalogue.

TANGYES GAS-ENGINE

"OTTO" PRINCIPLE. PINKNEY'S PATENTS.



THE 12-HORSE POWER (NOM.) ENGINE.

ENGINES OF ALL SIZES.

TANGYES LIMITED, BIRMINGHAM;

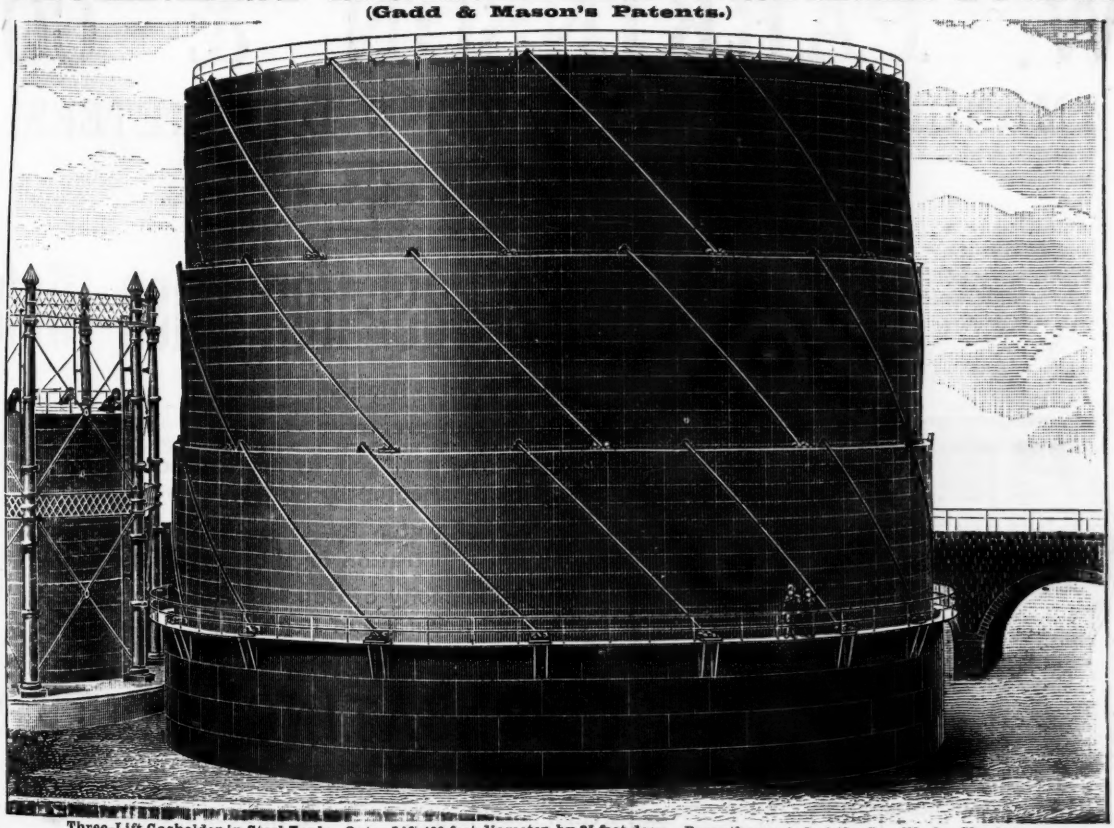
AND AT

LONDON, NEWCASTLE, MANCHESTER, GLASGOW, SYDNEY, MELBOURNE, JOHANNESBURG, BILBAO, ROTTERDAM, and CALCUTTA.

Telegrams: "TANGYES, BIRMINGHAM." No. 98 E.

COLUMNLESS GASHOLDERS WITH SPIRAL GUIDES

(Gadd & Mason's Patents.)



Three-Lift Gasholder in Steel Tank. Outer Lift 100 feet diameter, by 24 feet deep. Recently erected at the Gas-Works, Chester.

FOR SPECIFICATIONS AND ESTIMATES, WRITE TO

R. & J. DEMPSTER, LTD.

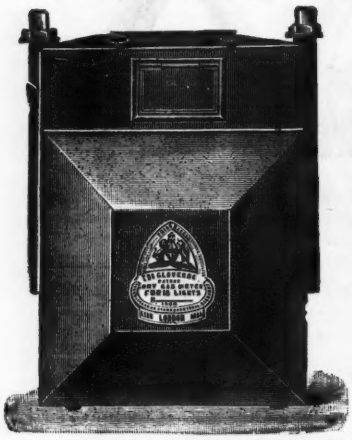
Newton Heath, MANCHESTER. London Office: 181, Gresham House, Old Broad Street, E.C.

[ESTABLISHED 1844.] **ORIGINAL MAKERS.** [ESTABLISHED 1844.]

LONDON, 1851. NEW YORK, 1853. PARIS, 1855. LONDON, 1862. DUBLIN, 1865. PARIS, 1867.

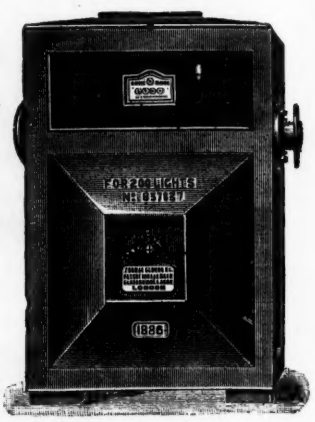
THE SIX MEDALS AWARDED TO THOMAS GLOVER'S PATENT DRY GAS-METERS;

The latter being the Highest Award for Dry Gas-Meters at the Paris Exhibition, 1867. Since then we have not Exhibited FOR PRIZES.



1st.—Are a remedy for all the defects of Wet Meters.
2nd.—Are suitable for all Climates, whether hot or cold.
3rd.—Incur no loss of Gas by Evaporation.
4th.—Cannot become fixed by Frost, however severe.
5th.—Are the most accurate and unvarying measurers of Gas.
6th.—Prevent jumping or unexpected extinction of the Lights.
7th.—May be fixed either above or below the level of the Lights.
8th.—Cannot be tampered with without visibly damaging the outer case.
9th.—Will last much longer than Wet Meters.
10th.—Will not cost more than one-half for repair that Wet or Water Meters do.

Are upheld for five years without charge.



Telegraphic Address: "GOTHIC LONDON."
Telephone No. 6725.

THOMAS GLOVER & CO.,

DRY GAS-METER MANUFACTURERS,

214 to 222, ST. JOHN ST., CLERKENWELL GREEN, LONDON, E.C.

BRISTOL: 62, VICTORIA STREET. *Telegraphic Address: "GOTHIC."*

BIRMINGHAM: 3, BRIDGE ROW, DERITEND. *Telegraphic Address: "GOTHIC."*

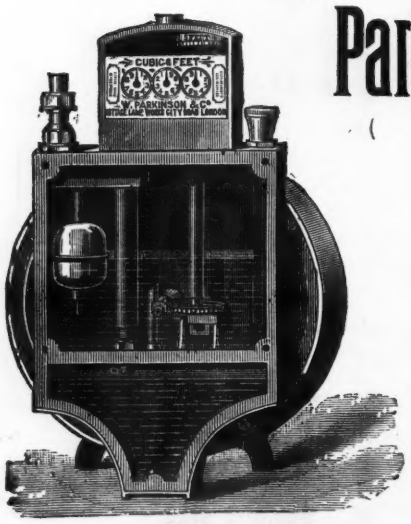
LEEDS: BOAR LANE CHAMBERS, 4, BASINGHALL STREET, *Telegraphic Address: "GOTHIC."*

MANCHESTER: 37, BLACKFRIARS STREET. *Telegraphic Address: "GOTHIC."*

W. PARKINSON & CO.,

MANUFACTURERS OF WET & DRY METERS.

OLDEST ESTABLISHED FIRM IN THE TRADE.



Parkinson's Cast-Iron Case Meter.

Works with very little friction.
Will stand very high pressures.
Cannot possibly be shut off by sudden increase of pressure; the float being affected by outlet gas only.
Allows for loss of water by evaporation without materially affecting the registration or shutting off the gas.
Unexcelled for Simplicity of Construction, Excellence of Workmanship, and Accuracy of Registration.

COMPENSATING METERS,

In Tinned or Cast-Iron Cases.

COTTAGE LANE WORKS, CITY ROAD, LONDON. Telegraphic Address: "INDEX."

BELL BARN ROAD WORKS, BIRMINGHAM. Telegraphic Address: "GAS-METERS."

10, MAWSON'S CHAMBERS, DEANSGATE MANCHESTER. Telegraphic Address "PRECISION."

[See Advt. p. 404.

CONTENTS.

EDITORIAL NOTES:—

GAS, LIGHTING, &c.— PAGE

The South Metropolitan Meeting . . . 365
The North of Ireland Association Meeting . . . 365
The British Association—Bramwell on Preece . . . 366
Schloss on Profit Sharing . . . 366
Local Option in Two Lights . . . 366
The Free Labour Association . . . 366

WATER AND SANITARY AFFAIRS—

The London Water and Thames Conservancy Bills Passed . . . 367
The Reports on the London Water Supply—A Curious Mishap in Connection with the Daily Analyses . . . 367

ESSAYS, COMMENTARIES, AND REVIEWS:—

Gas and Water Companies in the Stock Market . . . 368
Electric Lighting Memoranda . . . 368
The Prepayment Meter System Growing in Popularity . . . 369

NOTES:—

The Protection of Cast and Wrought Iron Pipes . . . 370
Portland Cement Testing . . . 370
Smoke-Washing by the Duller System . . . 370
The Behaviour of Flames in Foul Air . . . 371

TECHNICAL RECORD:—

North of Ireland Association of Gas Managers—Annual Meeting in Armagh—General Business . . . 371
Inaugural Address of Mr. C. B. Outon . . . 372
Société Technique du Gaz en France—The Papers Presented at the Annual Congress . . . 374
British Association for the Advancement of Science—Sectional Presidential Addresses; Research and Technical Training . . . 374
American Tests of Welsbach Burners . . . 376
German Association of Gas and Water Engineers—Lecture by Herr W. von Oechelhaeuser on the Gas Industry in the United States . . . 377

REGISTER OF PATENTS:—

Gas-Generators—Holt, H. P. . . . 379
Extraction of Naphthalene and other Hydrocarbons from Coal Tar and Similar Substances—Clark, F. W. . . . 379
Connection between Gas and Water Service Pipes and Mains—Woodward, J. 379
Dry Gas-Meters—Schreiner, J. R. . . . 380
Pilot Gas-Cock—Halliday, J. C., and Fenton, H. . . . 380
Liquid Meters—Thomson, J. . . . 380
Incandescent Gas-Burners—Moeller, J. . . . 380
Gas or Vapour Burners—House, H. A., and Symon, R. R. . . . 381
Burners for Incandescent Gas-Lamps—Thompson, W. P. (Weber, A. and Co) 381
Patent Notices . . . 381

CORRESPONDENCE:—

Retort-Settings at Manchester . . . 381
Another Improved Atmospheric Gas-Burner . . . 381
Hirschfeld's Patent . . . 382
The Meter System *v.* Inspection for Detecting Waste of Water . . . 382

MISCELLANEOUS:—

Meeting of the South Metropolitan Gas Company . . . 383
Crystal Palace District Gas Company—The Half-Yearly Report and Accounts . . . 385
Sheffield United Gas Company—The Half-Yearly Report and Accounts . 385
Provincial Gas and Water Companies . . . 386
The Bradford Corporation and the Rival Oil-Gas Processes . . . 387
The Inspection of Gas-Liquor and other Works under the Alkali Act—The Sub-Inspectors' Reports . . . 389
Water-Works Extensions at Oldham—The New Reservoir at Rooden . . . 390
Notes from Scotland . . . 391
Current Sales of Gas Products . . . 392
Coal Trade Reports . . . 392
Gas and Water Companies' Stock and Share List . . . 392

PARAGRAPHS.—Mr. Sidney E. Stevenson, 367—Alderman U. A. Ritson, J.P., 367—The Returns as to Gas Undertakings, 367—Death of Mr. F. W. Clark, 367—Eastern Counties Gas Managers' Association, 368—The Late Mr. W. Smith, of Douglas (Isle of Man), 368—An Address of Congratulation to Mr. W. Ford, 368—Mr. E. A. Woodward, 368—Death of Mr. D. B. Esplin, 368—Mr. A. Graham, 369—The Late Mr. W. G. Head, 371—Manchester District Institution of Gas Engineers, 371—Lectures on "Gas Manufacture" at New Cross, 377—The Literature of Sewage Treatment, 377—A New Constituent of the Atmosphere, 377—Coal in Ireland, 378—Pamphlets on Carburetted Water Gas, 378—St. Ives Gas-Works, 382—The Helio Incandescent Gas-Burner Company, Limited, 382—Barnet District Gas and Water Company, 385—The Colne Gas and Water-Works, 385—Belfast Corporation Gas Department, 388—The Gravesend Corporation and the Water-Works, 390—The Danger of Loose Gas-Taps, 390—The Halifax Town Council and the Management of the Gas-Works, 390—Notices of Accidents Act, 391—Leeds Corporation Gas Affairs, 393—Reductions in the Price of Gas, 393—A New Reservoir for Stratford-on-Avon, 393—The Garden Allotments at the Newport (Mon.) Gas-Works, 393.

TO CORRESPONDENTS.

No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

Telegraphic Address: "GASKING LONDON."
Telephone Number: 2789.

THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, AUGUST 21, 1894.

The South Metropolitan Meeting.

THE meeting of the South Metropolitan Gas Company on Wednesday last was fairly well attended, and was made the occasion for one of Mr. George Livesey's luminous addresses upon the data of gas supply, which are usually even more interesting and instructive to the student of the economics of the industry than they are to the proprietors of this particular Company. It is the habit of the South Metropolitan Chairman to speak to his fellow-shareholders as a man of business to his partners in a commercial undertaking. He does not treat them as so many money-making automata, who, having advanced so much capital, are only concerned in drawing certain dividends upon their investment. He takes them through the mill, so to speak, in which dividends are ground out, and tells how gas profits are made. The exercise is perhaps a little severe for some of his auditory who cannot claim lifelong familiarity with the most abstruse questions of gas polity. But they do their best to follow him, and seem to enjoy the "treat" provided for them. The first part of Mr. Livesey's speech of Wednesday last was devoted to an explanation of the position and prospects of the undertaking, which was of a character that, it is safe to say, could not be paralleled from any other source of expert information. The speaker then went on to deal with the subject of automatic prepayment meters; and he also explained at some length the system by which the Directors are converting their workpeople and consumers into shareholders. Having gone through the list of what may be called home subjects, arising out of, or suggested by, the matters mentioned in the Directors' report, Mr. Livesey devoted the last portion of his address to the recent deputation of aggrieved gas consumers to the Board of Trade.

Not in any sense did the South Metropolitan Chairman refer disparagingly to the neighbouring Company, whose proceedings were the cause of this agitation; and those among his audience, if any such were present, who expected him to carry on for another stage his controversy with Colonel Makins, were doomed to disappointment. Mr. Livesey did, however, tackle with a very strong hand Mr. Rowlands and his party; and he corrected several of the gross misstatements of fact that the agitators in question seem to have adopted as a kind of fuel for keeping their movement warm withal. Upon the subject of the possible transfer of the gas undertakings of London to the London County Council, Mr. Livesey was particularly trenchant; offering some observations that are not likely to be overlooked when this matter is discussed again in the public Press or anywhere else. It is notorious that the "Progressive" party in the London County Council would dearly like to have the gas supply as a means of making money in aid of the rates, and so of concealing from the Metropolitan ratepayer the cost of their method of management. They sigh for the money represented by the dividends now being paid to the gas proprietors; but in all probability it has hardly entered into the heads of most of the gentlemen of this particular party that, if the Local Authority were allowed to acquire the property of the Gas Companies to-morrow, it would have to be at a price that would leave little margin of profit for the new management. Mr. Livesey's treatment of this and other important topics arising out of the gas supply of London was calculated to comfort and reassure his hearers; while the tone of his references to the claims of the consumers and the public upon the Directors was unexceptionable. According to the way of the world, this virtue of Mr. Livesey's is left to be its own reward; for whereas half-a-dozen clamorous voices roundly denounced Colonel Makins a fortnight ago for speaking of a "common enemy" of gas companies, nobody has recognized that Mr. Livesey expressly hails the consumer as the partner and friend of the gas maker.

The North of Ireland Association Meeting.

THE meeting of the North of Ireland Association of Gas Managers in Armagh last Tuesday, under the presidency of Mr. C. B. Outon, was as successful a gathering as the Association has ever held. The Committee very wisely determine to conduct the business of this society on the easiest possible lines; and they do not overload their programmes with formal matters. Like all similar bodies, they experience a difficulty in procuring papers from the ordinary members, and consequently on this occasion it was found necessary to fall back upon the expedient of engaging the members in a conversational discussion upon "Experiences in Purification;" the subject being started by Mr. G. R. Love, of Dundalk. The President delivered the Inaugural Address which will be found elsewhere, and which contains the suggestion that the City and Guilds of London Institute would do well to hold examinations in gas-fitting. This observation is very much upon the lines of a criticism of the scheme of these examinations that appeared in these columns some time ago; and we are glad that Mr. Outon, who is a Whitworth Scholar, and owes much to modern agencies for technical training, keeps up his interest in the subject. Mr. W. B. Featherstone,

of London, contributed an appropriate paper upon small gasholder construction; and Mr. P. Hurll, of Glasgow, read a paper on the manufacture of fire-clay retorts, which included a plea for the adoption of standard sizes. There is not much to be said about either of these papers; but with regard to Mr. Featherstone's gasholder, it may be suggested that there is no advantage in lattice standards and girders of this size. A very neat job can be made more cheaply with merchant bars; and—especially in the case of a holder that may afterwards be telescoped—diagonal ties should be provided. Moreover, although the author gives to Mr. Henry O'Connor the credit for designing cups and grips of bent plates, it should be within the knowledge of every gasholder designer that this fashion of cups and grips bears the name of Piggott, of Birmingham, by which firm they were introduced many years ago. (See "King's Treatise on Coal Gas," Vol. II., p. 125.) If Mr. O'Connor has made any improvement upon this construction, we should like to have particulars of it. There are one or two other somewhat loose points in the paper, which it is hardly worth while to go into just now; but writers of technical literature, on however humble a scale, ought to guard against introducing misstatements which are apt to remain in the memories of those who hear them.

The British Association—Bramwell on Preece.

THERE was not much of special interest for gas engineers in the proceedings of the British Association at Oxford; but we give in another column an abstract report of portions selected from such of the sectional addresses as dealt with subjects least far removed from the classes of topics habitually treated of in these pages. The address of the Marquis of Salisbury was a masterpiece; and it may be recommended for perusal by all smart young students of science and technology, who are sometimes apt to rate the modern learning too highly, and to disparage the older culture. Lord Rayleigh's discovery of a new constituent of the atmosphere is a very remarkable instance of the irony of Nature, who has hidden this strange substance all these years in what, to employ the language of an obsolete philosophy, is perhaps the "element" of all others that men have flattered themselves they knew most about. The mere reflection that a new constituent of the atmosphere remained to be discovered in these days, is enough to make a University Extension lecturer take to his bed and die of chagrin. The subject of gas and electric lighting did not altogether escape mention in the course of the meeting; for a discussion upon a couple of electrical papers brought up Sir Frederick Bramwell and Mr. W. H. Preece in opposition over the comparative cost of lighting by the two systems. As a contemporary puts it, "Mr. Preece had given the easily remembered and interesting formula: 'Gas at 3s. per '1000 cubic feet equals electricity at 6d. a unit.' What Sir Frederick wanted to know, and what Mr. Preece did not appear to be able to demonstrate on the spot, was—how the interesting formula was arrived at." Bramwell pinning Preece must have been a spectacle for gods and men to chuckle over. Of course, Mr. Preece could not explain how he arrived at his formula—that is not his *forte*. It is not fair, as Artemus Ward once maintained, to take a man out of his *forte;* and in the case of the Electrician to the Post Office, the operation is positively cruel. Mr. Preece must have collapsed visibly under the puncture of the keen questioning to which he was subjected; and he probably left the room praying for the time when it may be his turn to question Sir Frederick.

Schloss on Profit-Sharing.

THE Labour Department of the Board of Trade has just issued a thick pamphlet, at the small charge of 10d., containing a report by Mr. David F. Schloss on "Profit-Sharing." In a prefatory letter addressed by Mr. R. Giffen to the Secretary of the Board, it is remarked that the first report on this interesting subject, by Mr. J. L. Whittle, was in its nature a summary of certain typical cases of profit-sharing occurring in different countries, with an account of the chief features of the system and of the various methods of practising it. The present report is more limited in scope, inasmuch as it hardly mentions the practice of profit-sharing existing in foreign parts; but in all other respects it is far more comprehensive and detailed, containing as it does a very complete history of profit-sharing in this country, from the earliest date at which such attempts were made, in the form of a concise account of every instance of profit-sharing of which it was practicable to ascertain the particulars, and of the nature of the results obtained by the application of this method both in cases in which the system has been discontinued for various reasons, and in those in which it continues in force. This should promote the study of the subject, and be of very material assistance to those who desire to form a judgment upon it. Mr. Schloss is as systematic in his way as Mr. Geoffrey Drage himself; and he starts his work by defining the meaning of the term "profit-sharing," which he formulates as consisting of an arrangement under which an employee receives a share "as an addi-"tional remuneration (over and above his ordinary wages) "for the labour he performs." Again, a distinction is made between profit-sharing and the payment of premiums on production over and above a specified standard, whether of quantity or quality. The next point is that the share in profits allotted to employees must, in true profit-sharing, be upon a previously determined basis. Having thus cleared the ground, Mr. Schloss proceeds with his story; and it is significant of much that almost the first conspicuous instance of profit-sharing he has to tell of—the historic case of the Whitwood and Methley Collieries—came to grief over a most unfortunate dispute between the employers and the Miners' Union. The South Metropolitan Gas Company and the Crystal Palace District Gas Company, of course, find a place in Mr. Schloss's interesting pages, which are likely to remain for some time to come the standard source of authentic information on the subject. We may find it necessary to return to this useful work on a future occasion.

Local Option in Two Lights.

THE event of the past week in Parliament was the rejection by the House of Commons of the Mines (Eight Hours) Bill, which stood confessed at the last as a measure framed in the supposed interest of the Miners' Federation, with the object of imposing a disability upon the Northumberland and Durham division of the coal-winning fraternity. It is, of course, to be supposed that all miners are brothers, or else the bottom falls out of the grand modern Collectivist idea. But, for the time being, at any rate, the brotherhood of Lancashire and Yorkshire with Northumberland and Durham is somewhat similar in its spirit to that of Cain and Abel. It was a curious feature of the last debate upon this Bill that, whereas its opponents offered to withdraw their opposition to the scheme of legislation if the principle of local option were admitted into it, its promoters declined to accept this principle, and for a very good reason; their object being not to impose the restriction of the hours of labour upon those districts which approved of it, but upon those which objected to it. The modern Trade Unionist view of the matter has since come out in all its bareness; for it has been argued in certain newspapers that since the northern miners are so "unfair" to their Federation rivals as to have a system of their own which they do not see their way to relinquish simply to please the latter, they should be compelled by law to reconsider their ways. This is the "advanced" notion of liberty—"everybody to do as I "please!" There is huge satisfaction in the knowledge that the Federation scheme of coecion has been quashed; for its success would have meant a variety of ulterior consequences for the coal trade that no dealers in, or consumers of, this staple commodity can contemplate with indifference. But in what a peculiar light does this little episode put the whole principle of local option, which has been made of late years a term to conjure with! Henceforward it will be pertinent to inquire, when the phrase is used, whether the option in question means the choice of a district to rule itself, or to impose its rule upon some other locality.

The Free Labour Association.

THE General Committee of the National Free Labour Association have issued their report upon the proceedings of the organization for the past six months; and the executive state that they are in a position to look back over their labours during this period with considerable satisfaction. This society, it may be observed, was started with the object of creating a central organization which shall represent the views and guard the interests of non-Union and Free Labour men generally. It is not opposed to Trade Unionism; and it has, indeed, several Trade Unionists upon its Committee. But it seeks to

uphold and defend the right of working men—unquestioned before the militant order of Trade Union leaders came upon the field—to join, or abstain from joining, any combination. "The true aim of the Association is to "protect the general body of labour from the tyranny and "dictation of socialistic Trade Union leaders." How necessary it is for somebody to undertake this task is shown by the statement that, though hardly one wage-earner in seven is a member of a Trade Union, the officials of these Unions are unremitting in their endeavours to persuade Parliament, the local authorities, and the general public that they, and they alone, represent the honest, self-respecting working man. This mischievous pretension crops out in all directions; but perhaps it was most completely and cleverly exposed in connection with the printing trade and the Government printing orders. Not long since, a deputation of Trade Unionist printers waited upon Sir John Hibbert to ask that in future the Government printing work should be given only to what they called "fair," or society houses; supporting their demand by making various imputations upon the manner in which non-society houses treat their hands and turn out their work. These imputations, however, were found by Sir John Hibbert to be false; and, as a matter of fact, it is known throughout the trade that the tyrannical rules of the printers' Union, and the endeavours of the leading spirits of this organization to reduce all workers to that dead level which is the ideal of Collectivism, have driven many, and are driving still more, of the very best men out of it. Hence the action of the Unionists, in trying to strike a blow, through the Government, at the free houses, is as much a confession of weakness as it is an unwarrantable assault upon the liberty of the subject. We understand that, though most of the members of its executive are unpaid, the National Free Labour Association, which sets itself to track out and to checkmate these oppressive operations, is in want of funds. Those of our readers who sympathize with the objects of the Association might, therefore, make themselves acquainted with the character of its work, and, if this is found satisfactory, do something to help those who in this way are trying, at some risk, to help themselves. It is little encouragement that Free Labourers get now-a-days. There are no fat Board of Trade berths, no Royal Commissionerships, for them, as there are for the wire-pullers on the other side.

Mr. Sidney E. Stevenson, whose return to England from Canada was announced in the JOURNAL for the 24th ult., will sail for the Cape on the 1st prox., to take the management of the Cape Town Gas-Works.

Alderman U. A. Ritson, J.P., of Newcastle, the owner of the Burnhope and Pontop Collieries, has been appointed a Director of the Consett Water Company, in the place of the late Mr. Matthew Coupland.

The Returns as to Gas Undertakings, ordered by the House of Commons on the 30th of April last, in continuation of previous Parliamentary Papers, were presented on Tuesday last, and ordered to be printed.

Death of Mr. F. W. Clark.—It is with much regret that we announce the death, on Friday last, of Mr. Frank William Clark, the well-known inventor and patentee of regenerative gas-lamps, and (in conjunction with Mr. H. S. Maxim) of the gas carburetting process and apparatus that has borne his name. Mr. Clark was a member of a notable family of gas engineers, identified for many years with the Imperial Gas Company, at whose King's Cross station—of which his eldest brother, Mr. John Clark, now in consulting practice, was Manager—he received his early training as a gas engineer. Nearly twenty years ago, Mr. Clark turned his attention to the design of isolated gas manufacturing plants for country houses, factories, &c.; and for this purpose he produced a highly ingenious apparatus for carburetting air, known as the "Autogen" machine. He was also interested in the application of gas to the lighting of railway carriages; and he patented a lamp with this object, which was exhibited at the Crystal Palace Electric and Gas Exhibition in 1881-82, and was, in effect, the first recuperative gas-lamp of the now common inverted type. He subsequently joined the Wenham Lamp Company, and assisted in the practical development of this system of gas lighting. The last years of his life were devoted to the extension of carburetting gas by means of petroleum spirit. He was an energetic worker, of great resource and perseverance; and his death at a comparatively early age was probably hastened by his incessant labours. In illustration of Mr. Clark's many-sidedness and inventive genius, we may refer to the abstract specification of one of his latest patents, which, by a sad coincidence, we publish in another column to-day.

WATER AND SANITARY AFFAIRS.

LEGISLATION has made good progress with matters relative to the London Water Supply during the session now drawing to a close. The Bills of the East London, the Southwark and Vauxhall, and the West Middlesex Companies have just received the Royal Assent; and it may be well to remember how very narrowly the first of these measures escaped rejection in the House of Commons—the second reading being carried by a majority of only one. Had that Bill been thrown out, the same fate would in all probability have befallen the Southwark and Vauxhall Bill; and the future supply of water to the Metropolis would have been seriously imperilled. The debate on the second reading of the East London Bill had the further effect of inducing the London County Council to withdraw their own Bill relative to the London Water Supply. This was done in consequence of some remarks made by Mr. Shaw Lefevre, suggesting that in the following year the Council might "come to Parliament with a definite "scheme and a definite policy." But the Council seem to have lost sight of the fact that this intimation from the Government was put forward as a reason why Parliament should not allow the East London Bill to be proceeded with in the present year. The way was to be left open for both the Council and the Companies to come forward with suitable schemes in 1895. But the way has not been left open. The plan proposed by Mr. Shaw Lefevre was not adopted by the House; and the result has been that the three Bills of the London Water Companies have become law. There is no occasion now for either the Council or the Companies to elaborate any large and definite measure. It is possible that we may hear something more of the project which has been devised by Mr. Walter Hunter and Mr. Fraser; but there is no way left for the Council to intervene, although they still entertain the notion of either getting hold of the present supply or introducing another. The passing of the Thames Conservancy Bill is also a matter of note in connection with the water supply of the Metropolis. This measure received the opposition of the County Council; but it has now become law. Certain amendments introduced by the Lords were agreed to by the Commons; one of the alterations being the addition to the Conservancy Board of a representative of the Dock Companies. It may be expected that the County Council will take the first opportunity of seeking some further representation for themselves. It was well for the Water Companies that the large addition to their annual payments proposed by the Bill underwent some reduction; the extra £12,000 being brought down to £7500. This will make the future contributions £25,450—a sufficiently heavy burden for the included Companies to bear, though Mr. Binnie urged that they should really pay some few thousands more. As matters now stand, the water question ought to rest; and perhaps this will be the opinion of Parliament. One feature of some importance is that the Local Authorities outside the Metropolis show a general desire to be independent of the County Council in any future arrangements respecting the supply of water. The so-called "Water Conference" at Spring Gardens has proved a *fiasco*.

Professor Dewar has taken the place of Dr. Odling as the colleague of Mr. William Crookes in reporting on the composition and quality of the London Water Supply. The monthly report just issued offers no explanation of the change, though some farewell words would not have been out of place. A curious result is now reported with regard to the daily analyses. It has been discovered—whether before or after the retirement of Dr. Odling is not stated—that for several months past the sample of water attributed to the Chelsea Company has, through some inadvertence, been derived in reality from the New River mains. This mishap being only just detected, the result is that the Chelsea Company are absent from the present record. What has been the effect of the error on previous reports is not declared; but we may presume the Chelsea Company have not suffered by the mistake. Messrs. Crookes and Dewar turn the incident to good account by saying that the apparent discrepancy between their figures and those of Dr. Frankland is now explained; thereby affording "confirmatory proof of the extreme accuracy to which "water analysis has been brought." To this we may add that it is also necessary to be sure as to the samples. Suspicion was first aroused in this curious case by the

circumstance that the analytical results obtained from the two samples were so much alike. Chemistry was not at fault; but there was a misapprehension concerning the stand-pipes. Passing on to a consideration of Dr. Frankland's report for the past month, we miss the water supply of the Kent Company from among the list of waters subjected to bacterioscopic examination. From one point of view, this is of no great consequence—the Kent water being free from all risk of contamination. Yet there was some utility in showing that there were microbes in the water drawn from deep wells in the chalk. Proof was thus given that microbes can exist in water unquestionably pure, and that their presence in the river supply is not a peculiarity. In the month of June, Dr. Frankland found 14 microbes per cubic centimetre in the Kent water. There were the same number in the main well of the New River Company, only 12 in the Chelsea supply, the same in one of the East London wells, 10 in the West Middlesex supply, and as few as 4 in part of the East London water. Every month the report bears witness to the excellent effect produced by the filtering arrangements of the Companies taking their supply from the Thames or the Lea. During last month the West Middlesex Company excluded from the supply 99·79 per cent. of the microbes existing in the river water.

Eastern Counties Gas Managers' Association.—At the half-yearly meeting of this Association on the 6th prox., the Hon. Secretary and Treasurer (Mr. H. Wimhurst, of Sleaford) will read a paper upon "The Prepayment Meter System;" and Mr. W. D. Child, of Romford, will deal with the subject of "Retort-House Construction."

The Late Mr. W. Smith, of Douglas (Isle of Man).—By the recent death of Mr. William Smith, the Engineer and Manager of the Douglas Gas Company, the Directors have lost the assistance of a valued servant, who for upwards of thirty years devoted himself to the improvement and development of the works under his control. Deceased was in his 70th year.

An Address of Congratulation to Mr. W. Ford.—There were two features of special interest at the quarterly meeting of the Stockton Town Council on the 7th inst. In the first place, the Gas Manager (Mr. W. Ford) reported that the make of gas in the month of June was 470,000 cubic feet in excess of the production in the corresponding month of last year; and, in the second, the Council unanimously adopted the following recommendation, which was submitted in graceful and appreciative terms by Mr. Alderman Hind: "That the Town Clerk be requested to prepare a suitable address of congratulation to Mr. Ford on the completion of his twenty-five years' engagement under this Committee, during which term he has most faithfully conducted the business of the gas undertaking with great credit to himself and with most satisfactory financial results; and that the address be engrossed upon vellum for presentation.

Mr. E. A. Woodward, the Engineer of the Wolverhampton Corporation Water Department, is to have his salary raised, by £100 (to £350). The recommendation that this increase should be granted came from the General Purposes Committee; and it was discussed at the meeting of the Council last week. Speaking in support of the proposition, the Chairman of the Water Committee (Alderman Marston) stated that whereas a profit of £2862 was realized last year, it was increased to about £5000 this year; and, for the first time, the Committee had been enabled to raise the reserve fund to the statutory sum of £10,000, which was intact and invested. This being the case, it was very probable that the Committee, at the end of the current year, would be able to make a grant of £2000 towards the reduction of the rates. During the time Mr. Woodward had been in office, he had effected a saving of a large amount of money in various departments.

Death of Mr. D. B. Esplin.—It is with deep regret that we have to record the death of Mr. D. B. Esplin, Manager of the Forfar Corporation Gas-Works, at the age of 47 years. He was a native of Forfar, and began life as a railway clerk. After some years, he received the appointment of clerk to the Forfar Gas Corporation. He served a few years in that capacity; and then, for a while, he filled the position of clerk to the Luton Gas Company. About twenty years ago, on the resignation of Mr. Innes, the then Gas Manager at Forfar, Mr. Esplin received the appointment, which he held till his death. He had been in ill-health for a number of years, and had been little heard of. At one time he used to attend the meetings of the North British Association of Gas Managers, and take part in the proceedings; but some years ago he resigned. Latterly the gas undertaking at Forfar has not been in a very flourishing condition; and it is to be feared that his lot was not the most pleasant—the Commissioners being averse to expending money on the works. He leaves a widow and family. At his funeral on Tuesday, there was a large attendance of the Commissioners; and of his brother gas managers there were present Mr. Geo. T. Myers, Mr. T. Douglas Hall, Mr. R. S. Carlow, Mr. C. Myers, Mr. Young, and Mr. J. B. Terrace.

ESSAYS, COMMENTARIES, AND REVIEWS.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 392.)

BUSINESS in the Stock Exchange has, on the whole, been quiet during the past week. A marked leaning towards dulness was apparent from time to time, which did not tend to advance prices; and there was besides a decided disposition to realize the profits to be obtained out of the recent improvements in value. Consols and other gilt-edged luxuries are rather lower; and even the American market has not effected the full degree of recovery which might legitimately have been calculated upon from the better aspect of the tariff problem—being checked by profit-snapping. The fortnightly account involved considerable attention; and the settlement has not passed without one or two failures. The Money Market received a small modicum of support afforded by the demand for Stock Exchange requirements; but the plethora of money is too great for it to have much effect. Business in the Gas Market was well up to the mark for the time of year, though perhaps a little quieter than in the preceding week. The upward march of prices is as strong as ever, and proceeds without a check—not even from profit-snapping. In Gaslight issues (which are now quoted *ex div.*), the "A" was steadily done every day at figures ranging but fractionally, and closing at 247-48. Good business was done in the secured issues; and all the preference and secured are quoted higher. Very little was marked in South Metropolitan; but towards the end of the week, they all jumped up freely—the "C" making the very large advance of 7. Nothing at all was recorded in Commercials; stock being scarce. Business in Surburbans and Provincials was almost infinitesimal; but improvement was apparent in Brentford and in Alliance and Dublin. Transactions in the Continentals were very moderate. But prices were on the rise; and the quotations of Union and Imperial show improvement. None of the rest presented anything calling for remark. Business in the Water Companies was very moderate, and at good prices; the only changes being a fair advance in Kent and New River.

The daily operations were: The Gas Market was rather quiet on the opening day; and the only movement was in the Foreign division—Continental Union and Imperial advancing 1 each. Tuesday's transactions were mostly in Gaslight issues, which were strong, but unchanged. Alliance new rose ½. Wednesday was a quiet day; but prices were excellent. Gaslights and Brentfords were quoted *ex div.*, at varying rates of advance. Thursday's business was largely in Gaslight "A," which touched 248½. Alliance old rose ½. In Water, Kent gained 3. Business was reduced to still smaller proportions on Friday; but many advances were made in quotations. Gaslight "G" and all three South Metropolitans rose 2 each; and Continental Union and Imperial, 1 each. New River advanced 2. Saturday's business was fair; all the prices being well maintained. South Metropolitan "C" improved 5.

ELECTRIC LIGHTING MEMORANDA.

The Lighting of the Tower Bridge—The Electric Supply Corporation in the Hands of a Receiver—Electric Lighting and Gas Companies' Increases.

SPEAKING paradoxically, the most striking recent incident in connection with the progress of the electric light in the City of London is the adoption of gas for lighting the Tower Bridge. We recently published a description of the lamps and gas-burners used for this purpose; and it only remains for us to bear witness to the success that has attended the efforts of the contractors—Messrs. W. Sugg and Co., Limited—to justify the preference accorded to gas by the Engineer and the Bridge Committee. Our readers will hardly need argument to be persuaded of the wisdom of this selection; but it is notorious that the substitution of electric lighting for gas, in the majority of instances where this change has been effected, has not been determined by an impartial comparison of the merits of the two systems. We are not concerned to deny that electric lighting is the more fashionable method for important streets and show places; so that its adoption in many instances has been advocated and carried out as a matter of course, and a point of municipal "progress" which was not to be discussed with reference to sordid considerations of cost or other material questions. Over and over again, gas companies and others have demonstrated the advantages of gas for street lighting, and have proved its capacity for almost unlimited improvement at the minimum of cost; but, notwithstanding these efforts, the fashion of electric lighting for first-class thoroughfares has established a hold upon local authorities which has seemed to defy considerations of economy and efficiency. In these circumstances, it is surprising that the Tower Bridge authorities should have hesitated a moment in lighting the structure by electricity, more particularly as the interest of the City of London Electric Lighting Company has been very dear to the Mansion House. It appears, however, that even the Bridge Committee recoiled before the enormous expense of an electric light installation for the job; while the Thames Conservancy

had something very serious to say about the danger to navigation that arc lighting would entail. So gas was chosen; and the result is satisfactory to all concerned. The bridge and its approaches are a perfect example of mild, equably distributed lighting; and while the expenditure upon this necessary service is comparatively small, the lamps are so disposed as to guide and assist rather than dazzle and perplex users of the waterway The whole thing is an object-lesson which the partisans of electric lighting may profitably study,

The news that the undertaking of the London Electric Supply Corporation has passed into the hands of a receiver appointed to act for Lord Wantage, the largest debenture holder, is mentioned by an electrical contemporary as coming as "a blow to all electrical engineers who have followed the vicissitudes of this bold undertaking with interest and sympathy." We have never withheld our small tribute of admiration of the splendid courage of Mr. Ferranti and his financial backers in this really daring venture; and now, when the step that unkind Fortune has rendered inevitable has been taken in the best interest of the proprietary, we can only express the belief that it is to Fate and the nature of the electric light business, rather than to individual demerit, that the failure of the Company is due. As the *Electrician* says, "at a date when most of the companies now at work in London were in a very embryonic stage of development, without capital, business, experience, or powers, the London Electric Supply Corporation possessed three out of these four requisites, and, had it been able to maintain its lead in this respect, and arrive first in the field, the £850,000 which has been sunk in this plucky endeavour to capture the electric lighting business of the Metropolis would now have been reaping an adequate reward." Unfortunately for them, the Company whose administrators conceived the brilliant idea of serving all London from Deptford were in advance of their epoch; and while waiting for the business that was expected to justify Mr. Ferranti's magnificent preparations, a deplorable series of untoward accidents nipped the early promise of an adequate return upon the enterprise, and threw the public into the hands of the more localized undertakings. Meanwhile, the concern is still going on, and may in the end realize the anticipations of its promoters, who were unquestionably in the right in thinking that electric light stations should be kept out of the town.

As might have been expected, the electrical journals have fastened upon a remark that dropped from Colonel Makins at the recent meeting of The Gaslight and Coke Company, which was an admission that the electric light "had stopped their increase, though it had not caused them to have a decrease." This was towards the close of a somewhat agitated discussion upon the different aspects which the Company's affairs present to observers from opposite sides of the directorial table; and the observation is not in accord with the more studied statement of the Governor at an earlier stage of the proceedings, when he said that "the increase or decrease in their sale of gas did not depend mainly on the competition of the electric light"—a conclusion which has been supported on previous occasions of the same character by statistics referring to certain typical districts. The probability is that the latter view is the correct one; and it is regrettable that, in the excitement of the moment, it should have been abandoned, or at any rate qualified. There is plenty of evidence available from other sources to show that, where the public are fairly well satisfied with the gas supply, a flourishing electric lighting undertaking does not noticeably affect the increase of consumption. This is true of Liverpool, Newcastle, Birmingham, and other places, where, to say the least, electric lighting is as flourishing a business as it is in London. The explanation is to be found in the fact that as towns grow in population, and push their suburbs ever farther afield, while what were once residential neighbourhoods are invaded by shops and factories, the demand for more light on the fringe of the district falls almost exclusively upon the gas supply. This observation is found to apply equally to the case of the gas and electric lighting industries of foreign countries, where both systems have fair play. It is the habit of our own newspapers, when dealing with gas matters, to assume that "electricity everywhere threatens its position as an illuminant." This remark occurs, in a recent issue of the *Daily Chronicle*, with reference to the South Metropolitan Gas Company; the writer having entirely overlooked the awkward circumstance of the Company having a large general increase, while admitting that the consumption of gas for cooking and heating purposes is steadily growing. So that it does not seem to matter whether or not a gas undertaking is on the increase, or what its spokesmen may have to say on the subject; the newspaper mind is fully made up about it. All the same, it is most desirable that technical opinion should be guided aright on this matter; and we are therefore constrained to lay stress upon the importance of the natural growth of towns, which takes effect mainly in the extension of their suburbs, as one principal reason why central electric lighting undertakings do not, as a rule, take up the increase for which gas-works administrators have to provide in the ordinary way.

Mr. A. Graham, the Manager of the gas and water undertakings of the Mansfield Corporation, has just had his salary advanced by £50 per annum.

THE PREPAYMENT METER SYSTEM GROWING IN POPULARITY.

When Mr. H. E. Jones told the assembled proprietors of the Commercial Gas Company at one of their ordinary general meetings, that the penny-in-the-slot gas-meter had "caught on" with the public, he expressed felicitously as well as colloquially a truth which events are day by day bringing into great prominence. It is now possible to employ another colloquialism in regard to this matter, and to say of the automatic prepayment meter system that it has "come to stay" in the gas industry. The adoption of the system by The Gaslight and Coke Company is a significant illustration of the force of the impulse that has set in this direction; and the statements of Mr. George Livesey at the South Metropolitan meeting last Wednesday supply an incontestable proof that the demand for this method of popularizing gas among a class of householders who have hitherto employed other means of lighting and cooking is no passing whim of the public, fostered by interested meter inspectors. The system must therefore be treated seriously by gas managers and their superiors; and we take the present opportunity of discussing the subject once more, in the light of the experience gained both by the friends of the movement and the sceptics in regard to its advantages, since we last dealt with it.

Like all other new suggestions, the automatic prepayment meter system of gas supply has been canvassed from all possible points of view; but those who believed in it have followed the wise course of letting it establish itself in action. "*Solvitur ambulando*" has been the motto of those gas administrators who, like the South Metropolitan Directors, began by thinking there might be something in the idea, and have arrived at the conclusion that the results actually achieved amply repay them for the risk and trouble of the experiment, while the promise for the future is greater than could have been hoped for. It was whispered at one time that the remarkable rush upon the system when it was first introduced into South and East London was due to nothing more than the offer of a half-crown premium to the meter inspectors upon the orders for new connections which they could secure. The premiums, however, had to be discontinued after a short period, in consequence of the really overwhelming number of applications received, which the resources of the meter makers were insufficient to meet. Yet the demands continued to pour in; and there is no present indication that the point of saturation of any Metropolitan district in this respect has been approximately reached. The South Metropolitan Directors reported on the 4th inst. a total number of over 19,000 prepayment consumers on their books; and this was increased to 20,000 by last Wednesday. There can be no artificiality about such a swelling volume of trade. It was a wise step, in the first instance, to enlist the sympathy of the meter inspectors and other members of the working staff in the new departure; for everybody knows that the lower order of officials connected with gas or any other established enterprise are not, as a rule, favourable to new movements which bring fresh work for them. But the day for this stimulus to the learning of a fresh lesson has already passed so far as the gas distribution staff of South and East London are concerned. A new class of gas-meter inspectors has been created where required for dealing with the special conditions of the new system of supply; and all the officials and workmen know that the business is to go forward in a regular and proper way.

We do not seek for a moment to create an impression in our readers' minds that the success of the prepayment gas-meter system is due to the patronage of a couple of London Gas Companies. On the contrary, it has been furthered by the sympathetic treatment accorded to prepayment meters in their early days by the managers of many large gas undertakings throughout the kingdom, who have greatly aided the makers of this class of meter in overcoming the multiplicity of defects in detail inseparable from the hasty development of the mechanical devices through which the system operates. A vast amount of ingenuity has been expended in perfecting these mechanical appliances, and in meeting the various exigencies shown by experience to be of likely occurrence in the ordinary use of the apparatus. And the heads of gas undertakings where the system has been adopted have also been busy in settling the novel administrative questions that have arisen in connection with it. A good deal of patient labour and remarkable skill has been required of both meter manufacturers and gas managers to place the prepayment system where it stands to-day.

The fundamental question which has underlain the whole of the movement is, of course, the commercial one—will it pay? Our readers will remember the communication addressed to us in June last by Mr. J. S. Cranmer, of Stratford-upon-Avon (see Journal for June 19, p. 1176), which expressed the timid view of the commercial question. This statement, by the way, emanated from a municipalized gas undertaking; and the action taken upon it by the Stratford Corporation may be cited in support of Mr. Livesey's contention that local authorities are not usually eager to try experiments in the popularization of gas supply. Mr. Cranmer made out that prepaying consumers are not likely to consume more than 6000 cubic feet of gas per head per annum, at which the system cannot pay. His data

and his treatment of them were both challenged by Mr. H. E. Jones; and it is now established upon authority that the average consumption by this class of users of gas amounts in the Metropolitan area at all events to double Mr. Cranmer's figure, or 12,000 cubic feet per head per annum. This factor of the amount of consumption governs the whole problem. In London, as we have seen, the quantity of gas burnt is large; and if it is argued that this is due to the late hours kept by the Metropolitan population, it may be replied that there is ample margin here for any reasonable correction for the earlier habits of some provincial townspeople. The most gratifying feature of this class of gas consumption is, moreover, its distinct tendency to increase. Poor people who have no experience of gas are apt to be a little afraid of it at first; but there are many indications that the absolute control over his expenditure for gas which the prepayment meter gives to the cottager, combined with a growing experience of the comfort of using it for cooking as well as lighting, induces increasing reliance upon it for these purposes. The working housewife rejoices in gas more and more as she realizes how much labour it saves her; and the cottager tells his neighbours how, having once had it in the house, he would not be without it again upon any consideration.

With a view of making sure upon the financial question, some gas companies have begun by charging their prepayment consumers a considerable excess, amounting to as much as 1s. per 1000 cubic feet, upon the ordinary price of gas; while others insist on the use of a gas cooking-stove. There should not be much coercion needed to introduce gas cooking into households where there is no servant kept; but the truly remarkable thing is that the rate at which the gas is charged for does not appear to affect the popularity of the prepayment system. We hear of towns where no effort has been spared to extend the consumption of gas by other systems, with the result of showing that the number of consumers was apparently incapable of being increased; yet the penny-in-the-slot meter has "gone like wildfire" from its first introduction. A certain gas manager in a small town in the eastern counties, upon being asked to try the prepayment meter system, mournfully replied that he had no hope of putting another half-dozen consumers upon the company's books, inasmuch as he had offered to fit houses gratis, and collect the rental monthly, and had had no response to his overtures. Nevertheless, he was induced to make a start with a dozen penny-in-the-slot meters; and he has repeated the order weekly ever since. The public appreciate the convenience of being able to help themselves to a pennyworth of gas. The peripatetic vendor of lamp oil is beaten upon his own ground of convenience and cheapness; and the price of gas does not trouble the cottager, for cannot he always get a pennyworth for a penny?

It is not for us to say which of the different makes of automatic prepayment meters now in the market is the best; but we are free to observe that the latest pattern of the arrangement devised by Mr. W. Cowan, which we have had an opportunity of examining, stands high as an example of the adaptation of mechanism to the desired end, with provision for protecting the seller of gas against such kinds of fraud and improper usage as experience has shown to be most probable in this connection. It is truly remarkable how quickly trickery follows upon the steps of commercial enterprise; yet it is impossible to feel very angry at the ingenuity, misdirected though it be, which enables some men, with whom honesty is probably a mere matter of policy, to get the better of an automatic machine. After all, such an instrument is a standing challenge to the members of the great army of those who never pay for anything that can be had upon other terms; but in the case of a gas-meter, detection is so certain to follow upon fraudulent interference with any part of the mechanism that it cannot be worth while for the user to play tricks with the prepayment mechanism. Everything of the kind, as well as defects of adjustment, can be covered by an agreement between suppliers and supplied, making the ordinary registration of the index at the end of the quarter the proof of what has been had. But it is obviously as well that tampering with the mechanism should also be made difficult. Of course, a prepayment meter cannot be made a coin-tester; but the inspectors can be relied upon to deal with customers who fill the cash-box with worthless substitutes for the currency. A more ingenious fraud is the soaped penny, and also the penny with a string attached—both of which are rendered inoperative by the latest improvements. Bent coins are apt to be troublesome; but these can be negotiated when the deformity is not too pronounced. It is difficult to conceive what the makers of these instruments can do further to ensure the proper treatment of their productions by the mischievious minority of the public. After all, however, the great bulk of the users of the automatic prepayment meters are not larcenous or even given to playing practical jokes with a piece of mechanism entrusted to their care for their own benefit. So long as a penny-in-the-slot meter works honestly as between the buyer and the seller of gas, it will be popular; and the most gratifying feature of the system is that there is no apparent limit to the popularity of these convenient appliances. An enormous trade has sprung up in the meters; and it is greatly to be hoped that no unintelligent restrictions may be imposed by officialism upon their extended use. Both the oil men and the electric lighting interest regard the new development in gas supply with envious interest; and it is pretty certain that either of these rivals of the gas industry would give much to acquire a similar means of popularizing their wares. Sanitarians, moreover, will soon awake to the significance of the new movement in gas supply, and will hail with satisfaction the prospect of the small smoky fire on the hearth of the cottage and the tenement occupier being superseded by the clean and handy gas-stove, which cannot contribute to the smoke nuisance of our towns.

NOTES.

The Protection of Cast and Wrought Iron Pipes.

Mr. M. P. Wood has remarked, in a paper presented to the American Society of Mechanical Engineers, that one of the most trying situations for the protection of his work that the engineer has to deal with is in the exposure of wrought-iron or cast-iron gas and water pipes to the cinder beds from blast-furnaces, rolling-mills, &c. Pitch compounds applied hot afford some measure of protection as compared with the naked iron; but the creep of the pipes due to changes of temperature, the action of the sulphur in the cinder or ashes, and their porous nature, which enables air and moisture to get at the pipes, all aided by the vibration due to the passage of railway trains and road traffic, combine to render the problem difficult of solution. Mr. Wood recommends a thick puddle of good clay of a thickness all round of at least one-half of the diameter of the pipe, and, in cases of pipes under 8 or 10 inches, of an equal thickness, as giving a good protection and material assistance in prolonging the life of the pipes, whatever compound is applied to them exteriorly. The author refers to the question of the electrolysis of underground pipes, which he appears to think might be checked, at least in part, by the use of Portland cement joints; and he suggests that the protective power of lime mortar and hydraulic cement to prevent corrosion in iron and steel under certain conditions, although demonstrated by centuries of actual use, is not sufficiently recognized by modern engineers.

Portland Cement Testing.

A recent article in *Engineering* points out that, while the tensile strength of coarsely-ground Portland cement, gauged neat, is much greater than that of the same cement finely ground, the tensile strength of a mixture of the former with sand is much less than that of a similar mixture made with the latter. It is argued from this that the tensile strength of neat cement is a comparatively useless test in assisting us to form a correct judgment as to the true value of the material. Nor does it seem reasonable to expect that the tensile strength of any material should furnish an indication of its cementing power. If, however, it should be desired to know the true tensile strength of cement, the active portion alone should be used—the inert portion being removed by a No. 180 sieve. It is remarked that, by the introduction of the sand test, a step was made in the direction of more correctly estimating the qualities of cement on which its value depends; and the test is applied under conditions more nearly approaching those in which the material enters into construction. On the other hand, it is open to the objection that, in practice, mortar and cement are very seldom called upon to resist direct tensile stress. The sand test is one partly of cohesive and partly of adhesive strength in unknown proportions. The evidence is altogether in favour of this test, as compared with that of neat cement. After discussing the questions of fineness of grinding, weight per bushel, and colour, the writer comes to the following conclusions: (1) That the strength of a mixture of cement and sand is the most reliable of the present tests. (2) That the tensile strength of neat cement may be omitted altogether as a test of good quality. (3) That the weight per bushel is misleading, and should be omitted. (4) That colour is not of sufficient importance to be considered as a test. (5) That extreme fineness of grinding is so absolutely essential, that a sieve of not less than from 175 to 180 meshes per lineal inch should be used for testing purposes. The result of experience, therefore, compels us to arrive at the further conclusion that the present method of testing Portland cement requires very considerable alteration.

Smoke-Washing by the Dulier System.

Mr. R. R. Tatlock, Public Analyst and Gas Examiner for the City of Glasgow, some time since reported favourably, from the chemical standpoint, of the Dulier system of smoke-washing, as applied to a Babcock and Wilcox boiler chimney. This boiler needed to be constantly forced with dirty coal; resulting in a continuously smoking chimney. The consumption of coal was about 3 tons per day, besides about half a ton of wood scraps and chips burnt to get up steam. The Dulier apparatus consists of a structure in fire-brick with one ascending and one descending flue—the latter lined with tarred steel plating. A jet of steam from the boiler helps the smoke gases up the rising flue; and a shower of water drives them down the second flue, which has a drain at the bottom. After this treatment, the smoke is free to pass out by the chimney. There is no moving machinery of any kind, as in the Elliott apparatus; and the draught in the flues is not interfered with. The object of steaming the smoke is to assist the condensation of the tarry hydrocarbons, and to damp the mineral dust so as to make it

more amenable to the subsequent shower-bath treatment. Mr. Tatlock finds that, in practice, the system removes rather more than one-half of the sulphurous acid from the smoke gases, and also arrests from 94 to 97 per cent. of the soot. It is pointed out that, in the particular instance given, this means a reduction of output of sulphurous acid from about 30 lbs. to 14 lbs. per day, and of soot from 100 lbs. to about 6 lbs. As these figures show, the total quantity of soot to be dealt with has comparatively little weight; and it would scarcely pay for the erection of costly plant to recover it as fuel. This is all the more evident when it is considered that the soot consists largely of mineral matter or ash; the carbon in it amounting only to 75·6 per cent. Mr. Tatlock observes that it ought to be kept in view, in considering the question of smoke prevention by special stoking, mechanical or otherwise, that no system of firing can mitigate in the smallest degree the quantity of sulphurous acid poured out from the chimney; whereas the Dulier system does away with more than half of it. The consumption of water in the experiment under notice amounted to about 8000 gallons per day, costing 2s. at the Glasgow rate. But it can be filtered and used again.

The Behaviour of Flames in Foul Air.

At the last meeting of the Federated Institution of Mining Engineers, Dr. Frank Clowes read a paper on "The Proportion of Carbon Dioxide (Choke-Damp) in Air which is Extinctive to Flame." It contained a suggestion of a method for ascertaining the limit of safety of mixtures of carbon dioxide and air. It appears from Dr. Clowes's own experiments, in which the effect of atmospheres containing known proportions of carbon dioxide was determined from a variety of naked flames, that candles and ordinary lamp-flames, inclusive of colza and petroleum and ordinary lamp paraffin, cannot live in an atmosphere containing from 14 to 16 per cent. of added carbon dioxide. On the other hand, the flame of burning hydrogen is not extinguished until 58 per cent. of carbon dioxide has been added to the air; and coal gas will burn with 33 per cent. of added carbonic acid. Methane will only stand 10 per cent., while carbonic oxide will endure 24 per cent. of the same addition. The author exhibited a lamp in which a flame of hydrogen was burning at the side of an oil-flame, and he showed the superior endurance of the former when exposed to vitiated air. He concluded by remarking that the wisdom of attempting to pass through foul air in mines, wells, &c., has been questioned, because it has been assumed that an atmosphere which contains sufficient carbon dioxide to extinguish the oil-flame of a safety-lamp would necessarily be irrespirable, or at least dangerous to life. Experiments recently conducted by Mr. T. H. Wilson, however, have gone to prove that rabbits can breathe with impunity for an hour at least, air containing 25 per cent. of carbon dioxide. The presence of 16 per cent. of this impurity extinguishes the ordinary safety-lamp flame. Hence it appears that respiration can be maintained unimpaired in air containing at least 10 per cent. more choke-damp than is sufficient to extinguish the oil or alcohol flame of a safety-lamp. If Mr. Wilson's experiments are accepted, it would evidently be well to have some test less sensitive than the ordinary safety-lamp flame to indicate whether an atmosphere contains sufficient carbon dioxide to be dangerous to life. Since the flame of ethylene is only extinguished with 26 per cent. of added carbon dioxide, such a flame might serve the purpose. It is worthy of notice, in this connection, that a naked coal-gas flame will seemingly continue to burn in air that has long passed the limits of added carbon dioxide compatible with the preservation of human life.

The Late Mr. W. G. Head.—By the death of Mr. Walter G. Head, which took place on the 30th ult., at his residence, Ingress Cliff, Greenhithe, in his 76th year, a vacancy was caused in the directorate of the Northfleet and Greenhithe Gas Company, Limited, with which deceased had been connected for a period of twenty years, for the latter part of which he filled the position of Chairman. The late Mr. Head was in the service of The Gaslight and Coke Company for about half a century; and he was therefore a practical authority up on all matters connected with gas making. He was greatly respected by his employees, and a large circle of private friends.

Manchester District Institution of Gas Engineers.—As already announced in the JOURNAL, the quarterly meeting of the above Institution will be held at Huddersfield next Saturday, under the presidency of Mr. J. Braddock, of Radcliffe. According to the programme issued by the Hon. Secretary (Mr. S. S. Mellor, of Northwich), the members will meet at the gas-works for the transaction of the business. Three new members will be proposed for election—Mr. Grimshaw, of Calverley; Mr. Lupton, of Otley; and Mr. W. Newbigging, of Manchester. The Corporation Gas Engineer (Mr. W. R. Herring) will read a paper descriptive of the works under his charge; and these will afterwards be inspected. The features of special interest will be the apparatus connected with the oil-gas process, the installation of inclined retorts, and the coal elevating and conveying machinery. A visit will also be paid to the electric light station; and after lunch at the George Hotel, the members will be conveyed to the Butterley reservoir of the Corporation, where the Resident Engineer (Mr. Hughes) will explain the works in course of construction.

TECHNICAL RECORD.

NORTH OF IRELAND ASSOCIATION OF GAS MANAGERS.

Annual Meeting in Armagh.

The Annual Meeting of the above Association was held in the Lynn Memorial Hall, Armagh, last Tuesday—Mr. C. B. OUTON, Wh. Sch., of Dublin, in the chair. There was a good attendance of members.

The PRESIDENT, in opening the proceedings, welcomed the members to Armagh, and expressed the hope that they would be able to carry out the object of the Association, which was self-improvement.

REPORT OF THE COMMITTEE.

The HON. SEC. and TREASURER (Mr. J. Whimster, of Armagh), read the report of the Committee, as follows:—

In presenting their annual report, the Committee trust that, although the programme for the Armagh meeting may not give prominence to any of those subjects which form topics of special interest at the present time in similar gatherings, the extremely practical nature of the communications which it does contain will make the meeting a particularly profitable one.

The Committee still feel the difficulty of getting the ordinary members to contribute set papers to these meetings; and they would again seek to impress upon them the desirability of all contributing, in some measure, to the transactions of the Association. They trust that the open discussion provided for this year may prove a successful departure from the ordinary routine.

Owing to some difficulties in the way, the South-West of England District Association of Gas Managers failed to get together a meeting of representatives to consider their scheme for the federation of District Associations; so that this question is—in the meantime, at all events—in abeyance.

The following letter has been received from the Secretary of the Eastern Counties Association of Gas Managers:—

> JAS. WHIMSTER, ESQ.
>
> Dear Sir,—It is thought by gas managers in this and other districts, that the action of the makers of prepayment meters in reducing the period of guarantee from five years to one year for coin meters should be resisted by gas managers, and that, unless the makers withdraw the shorter period in favour of the usual five years' guarantee, some action should be taken in the matter. I think that the subject is of sufficient importance for you to lay the matter before your Committee before the next meeting, and to suggest to them the desirability of discussing the question with the members of your Association at the autumn or next meeting. I shall be glad to hear the views of your Committee upon the question at an early date.
>
> Yours faithfully, H. WIMHURST,
> Hon. Sec. and Treasurer.

The Committee would be glad of an expression of opinion from this meeting on the subject.

The Committee regret exceedingly to record the loss by death during the year of one of our extraordinary members—one who was present and joined the Association at its formation in 1887, and who has taken an active interest in, and been present at, every meeting since—Mr. John Allan, proprietor of the *Gas World*, London.

The financial statement and Auditor's report show that the Association has at its credit a sum of £24 9s.

The success of the excursion the day following the business meeting last year induced the Committee to provide for a similar feature in connection with this year's meeting, which they trust will prove even more popular.

According to Rules 25 and 26, three members of the Committee retire now, and are ineligible for immediate re-election. The retiring members are Messrs. Gibb, Nisbett, and Ross.

C. B. OUTON, President.
JAMES WHIMSTER, Hon. Sec.

GUARANTEES OF PREPAYMENT METERS.

The PRESIDENT said he should be glad to hear some remarks on the subject of Mr. Wimhurst's letter.

Mr. W. B. FEATHERSTONE (London) said he thought every gentleman who had had experience of prepayment meters should state whether they were reliable for one year or for four or five years. He had had prepayment meters in his charge, and had found them good for two years. He could not speak for longer; but he presumed there must be gentlemen present who had had them for four or five years. If they found them to be different from ordinary meters, he did not see why they should ask the makers to guarantee them. As engineers, they should find some means of obviating the disqualification, whatever it was, which the meter makers seemed to think made it necessary to distinguish between one and five years.

Mr. P. J. SALMON (Galway) said that for the past month he had been testing three prepayment meters; and they were not satisfactory. He thought it would be very hard on parties who ordered these meters, and had them in store for probably a twelve-month before they sent them out to consumers. He considered the manager should be allowed to see first whether they were to be sent out. His opinion was that the inserted coin opened the valve right enough, but that the meter gave off gas for a time without recording it. His opinion was that they ought to have some guarantee, as with other meters.

Mr. W. MILLER (Cookstown) said he had had some meters that were reliable. At first, he was inclined to think otherwise; but now he thought the difficulties had been greatly overcome.

Still he would not care to have a guarantee for only one year, because, as Mr. Salmon had remarked, they might not have sent them out, or a meter might be faultly when it came into their hands. He did not see why, if a meter were reliable, the makers should not give a guarantee.

Mr. A. MACKENZIE (Edinburgh) observed that the question of cost had been before the meter makers; and their opinion was that, for a small increase in the price, they could give a guarantee. The making of prepayment meters had been a very expensive matter; and if they were to guarantee them, they would require to have a little more money for them.

Mr. J. WHIMSTER (Armagh) said his experience of prepayment meters had not been an unfortunate one at all. He had not gone in very largely for them; but he thought he had had about a dozen—for a twelvemonth in some cases—and only two of them had given him trouble, and that was shortly after they were put in. He had not returned them to the makers. It was not the automatic arrangement that had gone wrong; but the meters seemed to have failed to pass gas. He thought, however, that one year's guarantee was too small. The point which Mr. Salmon had raised was a very material one, and one that would militate against the meter makers, because if they ordered meters they generally asked for more than they needed at the time. They did not order from hand to mouth, but for stock; and if they had a prospect of keeping meters only as stock, they would not require them. He thought the way to overcome the difficulty would be for makers to fix a proper price for their meters, so that they would be able to give a guarantee with them. They did not wish to have the meters at less than cost, nor did they desire to pay fancy prices for them; and they certainly did not want them for nothing.

Mr. A. GIBB (Newry) said he had not had any prepayment meters, but had been watching other people's experience; and if the circumstances were as stated, he thought it was necessary that every Association should take the matter up, and make a decided stand, in order that gas consumers and gas companies might be protected. If the makers sent the meters out, as they said they were, accurate, he did not see why they should refuse a guarantee. It would be very suicidal if they adopted such a policy; and he held that gas managers should stand to a resolution to insist upon the necessary guarantee; so as to protect themselves and the community, and at the same time serve the meter makers.

Mr. SALMON said it was not in any spirit of harshness to the meter makers that he made the remarks he did. They did not make the price; it was the guarantee that was wanted, because if a meter passed gas without registering it, or did not shut off the gas properly, this was sufficient loss to the company.

Mr. MACKENZIE said the makers had for some time found that they were making these meters at a loss; and they now considered that, if a guarantee were wanted for five years, they would have a still further loss. He thought the proposal was that the increase suggested would not be 10 per cent.

Mr. WHIMSTER: Ten per cent. would be 4s.

Mr. MACKENZIE: Yes; I believe that the guarantee will be given on these terms.

Mr. FEATHERSTONE said he could not see, from what he had heard of the discussion, that any person, after a meter had stopped, had taken it to pieces to see why it had done so. He had found a meter stopped by some very simple thing; and at times by just giving it a slap, it went off all right. Had Mr. Salmon inquired why his two or three meters stopped?

Mr. SALMON: No; if you know what is wrong with a meter, you should tell the meter maker.

Mr. G. R. LOVE (Dundalk) considered the matter had been pretty well discussed by the members; and he thought they might go on the lines of remitting the subject to the Committee of the Association to investigate, and give them powers to draw up a resolution and send it to the Association which had written to them. He moved to this effect.

The PRESIDENT said he had an idea or two which he would like to express. He thought prepayment meters were designed at very short notice to meet the demand of a new class of consumers; and in all probability this short period was hardly sufficient for the design to be as accurately carried out as subsequent experience would indicate. To his mind, it was rather a humiliating confession on the part of meter makers that they could only guarantee the accuracy of these meters for so short a period as one year; and he considered that, if this idea went forth to the public, it would not increase their respect for the meter in general. At present, some of the notions of the public were rather crude. They looked on a meter as embodying the idea of perpetual motion—against themselves; and he thought the extension of the guarantee to five years should be insisted upon on the part of those who intended to purchase.

Mr. GIBB moved that the Association should recommend the meter makers to fix such a price for prepayment meters as would allow them to give a five years' guarantee.

Mr. SALMON seconded the motion.

Mr. LOVE thought it would be a mistake to come to such a resolution, as it would be premature; and therefore he formally proposed, as an amendment, that the matter be remitted to the Committee to investigate.

Mr. J. NISBETT (Portadown) seconded the amendment.

A show of hands was then taken, and Mr. Gibb's motion was carried by seven votes to five.

NEW MEMBERS.

The following were elected members of the Association:—

Ordinary Members.—Dewar, J., Newtownards; Woods, W. J., Aughnacloy; Cummings, W., Ennis; Keogh, W., Killarney; Cronin, J., Middleton; and Hannen, H., Youghal.

Extraordinary Members.—Norman, G., Dublin; Duncan, T., Glasgow; and Forsyth, J. R., Glasgow.

Mr. FEATHERSTONE remarked that it was the intention, when the Association was started, to form one united Ireland; and he was glad to see that this was being carried out.

A telegram was read from Mr. W. S. Stormonth, of Coleraine, the President last year, expressing regret at being unable to attend the meeting; and Mr. Whimster apologized for the absence of his Chairman, or one of the Directors of the Company, to offer the members a welcome, as, being market day, they were, he said, all engaged.

ELECTION OF OFFICE-BEARERS.

The following were elected office-bearers for the ensuing year:—

President.—P. J. Salmon, Galway.

Vice-President.—T. Frizelle, Holywood.

Members of Committee.—M. Martin, Drogheda; D. Williamson, Ballybay; and J. M. Auchterlonie, Mullingar.

Hon. Secretary.—J. Whimster, Armagh.

Auditor.—E. Stears, Lisburn.

Mr. SALMON, in returning thanks, said it was a great satisfaction to him, coming from Galway in the West, to be elected President of the North of Ireland Association. He hoped they would spread out their wings, and bring in the whole of Ireland.

Mr. FRIZELLE also returned thanks.

Mr. WHIMSTER, in thanking the members for his re-election, said he would have been glad to have seen some other person initiated into the office he held; but at the same time he would be glad to do what he could.

THE PRESIDENT'S ADDRESS.

The PRESIDENT then delivered the following

INAUGURAL ADDRESS.

Gentlemen,—Let me take the earliest opportunity of thanking my fellow members of the North of Ireland Association of Gas Managers, for conferring on me the honour of the presidency—an expression of your esteem which I highly appreciate.

In making some introductory remarks, I am troubled at the outset to find a few topics which will be of interest to the members; and this difficulty is not lessened by the many excellent addresses which have already been delivered by members of the gas profession—gentlemen, I may say, of far greater experience than myself. I will therefore ask your kind indulgence, while I touch upon a few matters of general interest to the members of the North of Ireland Association. Some of the ideas may prove suggestive; and I have endeavoured to make them practical, and of present-day importance.

It was my privilege, on the occasion of last year's meeting at Coleraine, to bring under your notice a description of an oil-gas plant for the lighting of the whole of the Great Southern and Western Railway carriages; and I am happy to report that the favourable anticipations of its working have been fully borne out by the subsequent results. The future employment of the tar produced as fuel, and that of the hydrocarbon for enriching our coal gas in place of cannel, will cheapen the production to a greater extent than was originally contemplated. During the last year, we have fitted up nearly one-half of the coaches with oil-gas lamps; and the lighting is considered satisfactory in every respect. The inevitable mixed train-lighting, during the transition, affords a ready means of observing the marked contrast between the new light and the old mineral oil lights. The main-line lighting is nearly completed, and the branches have been commenced; and it is estimated that another year will see the whole of the stock fully equipped. I trust the example set by the premier Irish railway will be followed by the remaining lines, and the dirty and indifferent oil-lamps be relegated to things of the past—an occasional one being preserved for presentation to a museum of antiquities.

I do not think the applications of compressed gas, whether manufactured from coal or oil, are by any means exhausted. Already, as some of you may be aware, a few omnibuses, plying in the English Metropolis, are lighted with compressed gas; and there appears no reason why the system should not be extended to tram-lines. Possibly, in the not too distant future, we may also see it extended and used for motive power on trams. The JOURNAL OF GAS LIGHTING has reported some successful experiments in Germany of this system of propulsion; and gas companies may yet have a much larger day consumption by this new application of gas.

I presume that few of us were fortunate enough to escape from the inconvenience of last year's strike; and several instances occurred of stocks of coal at gas-works being nearly exhausted. In my own case, the loss of one cargo by the foundering of s.s. *Captain Parry*, off Holyhead, did not improve matters; and a subsequent consignment was received just in the nick of time. This brings me to the almost worn-out question of storeage of coal, and serves us with one more illustration that the capacity should be as large as possible, with a minimum accommodation

of (say) one-third of the annual consumption, and, of course, with suitable protection from damp, to prevent deterioration of the coal.

The question of regenerative retort-settings has largely engaged the attention of gas managers during the past year; and the favourable experiences of several of our own members will greatly tend to their gradual adoption when renewals of stacks, or extensions of plants, are required. One thing is proved beyond controversy—namely, that, by the displacement of "six-hour" in favour of "four-hour" charges, we have a certain means of readily increasing our output, and at the same time obtaining a greater economy of fuel, with a consequent increase in the coke credit.

The past year's experiences of carburetting water gas, by a few engineers of large works, has once more directed the attention of the British gas world to the practicability of producing a large volume of gas on comparative small areas, and has demonstrated the great advantages to be derived where area for retort-house extension is limited; while the cost of production bears a favourable comparison with that of coal gas. I must confess, however, that I am entirely opposed to the introduction of water gas, on account of the well-known high percentage of carbonic oxide it contains. Any opposition to its introduction on this score has been frequently described as making a "bogey" of the carbonic oxide; but, to my mind, it is a bogey of a very substantial nature. It does not need an extensive chemical knowledge to understand how highly poisonous even a small percentage of this gas is; and, of course, the danger to consumers varies in direct ratio to the quantity diluted with ordinary coal gas. To my mind, the proprietors of gas-works would incur very heavy liabilities for compensation for accidental poisonings from leakages; and I cannot conceive any greater arguments electric lighting promoters could desire than depreciating such a compound when extolling their own wares to a credulous public.

I am pleased to note that demonstrations of cookery by properly qualified lecturers have been given in many towns, thus tending to considerably enhance the revenues of gas companies by the extended adoption of gas-cooking stoves. But is it necessary for lectures to stop at applications to cookery? I take it one of the chief objects is to create an increased day and summer consumption, and thus procure a maximum of return for the outlay of capital. There is no reason why the attention of the public should not be occasionally called in this way to the many advantages to be derived from the further application of coal gas to gas-fires, for intermittent service and sick rooms, the heating of bath water, and heating burners for laundry work. With regard to gas-fires, I fear they may have occasionally fallen into bad odour by the lighting-back of the burner, and the consequent unpleasantness produced by the formation of acetylene. A very recent invention, which has entirely overcome this difficulty, will doubtless increase their popularity. Some information should be given at lectures about the ill-effects produced by indifferent and badly constructed globes. There is scarcely any town where numerous examples of opal and muffed globes, obstructing from 50 to 60 per cent. of the enclosed lights, are not still in active use. Other instances occur where the flames are in a state of one continuous flicker, caused by the narrow inlet-openings; and the consumers' attention might be frequently called to the great advantages accruing by the employment of globes with openings at least equal to the full width of the flames, and also to the use of properly constructed burners. In giving information about burners, it should be insisted that flames of regular shapes should be aimed at; that small burners sometimes pass double the reputed quantity of gas, with indifferent results; and that some of the best effects are obtained with No. 6 burners, turned down so as to pass about 5 feet per hour.

The extension of prepayment meters has received a great impetus during the past year; and the idea of pennyworths is fast finding favour with that class of consumers to whom a quarter's gas bill, and the cost of gas-fitting appliances, would form an insuperable objection. While catering for our poorer consumers, the attention to the larger ones must be continually maintained; and I know of one company who now offer to clean out consumers' services and fittings free of charge. The wages of the competent fitters employed have been more than covered by the profits derived from the increased consumption produced by the removal of the obstructions, which local gas-fitters have failed to remedy.

The incandescent gas-burner appears to be gaining in favour. The great brilliancy and steadiness of the light produced, renders it particularly favourable for shop illumination; and the probable extension of the system to street lighting during the ensuing year will doubtless increase its popularity. When it is borne in mind that the ordinary 5 feet per hour flame is replaced by 3½ feet burnt in this manner, with an illumination of about 50 candles, it will render the supersession of gas by the electric light in many cases extremely improbable.

Possibly gas managers may see their way to become retailers, to a greater extent than at present, of those domestic articles that have a distinct bearing upon their staple manufacture. The so-called "Trade," who still supply cheap petroleum lamps (with their accompanying glass, or porcelain, bowls for containing oils of low flash-points, to the constant danger of the poorer classes), are surely not the most enlightened persons to forward the interests of gas companies. I look forward to the time when stoves specially designed for coke burning, including slow combustion stoves, bath heaters, heating and lighting burners of the most approved patterns, together with globes, will form a portion of the stock-in-trade of each well-managed gas-works. In the case of coke heating-apparatus, they might be supplied on the hire system; and domestic customers thereby be increased. At this period, it is hardly necessary to dilate upon the importance of each manager aiming at complete supervision from the retort to the burner, in order to minimize complaints of "bad gas," which are usually caused by defective house fittings and restricted services.

I am often struck with the insignificant number of gas-works assistants in Ireland who submit themselves for the examinations in Gas Manufacture, held under the auspices of the City and Guilds of London Institute. The questions set are of a highly practical nature, which is only to be expected from examiners of such professional status. The possession of the full Technological Certificate, involves the candidate having previously passed in at least two science subjects—such as mechanics, chemistry, light and heat, &c. Surely the possession of such a certificate must stamp the recipient with a certain hall-mark of proficiency, and, when combined with a fair amount of gas-works practice, would doubtless be of immense assistance in his future promotion. While on this subject, I think the attention of the Institute might be directed to the advisability of holding examinations in "Gas-fitting." There is plenty of improvement needed on the part of many engaged in running services and erecting fittings; and intelligent ideas on proportioning services and on the principles of combustion, would tend to the employment of fittings and burners giving higher efficiency.

In conclusion, I trust our Association will continue to increase its membership and extend its usefulness. I can testify to the great advantages to be derived from the interchange of ideas; and the useful information obtained undoubtedly improves our practical working, and results in greater economy in those works we control. For this reason, I think the Association commends itself to the sympathy and co-operation of directors and shareholders of gas companies in Ireland; and one way of helping, would be by their inducing managers who are as yet outside to become members, so that its power and usefulness may be extended.

Mr. Gibb said he thought they should express their hearty thanks to the President for his admirable address. There was a great deal of matter in it which would afford them much pleasure and profit when they had it in print.

Mr. Love, in seconding the proposition, said he was sure it had been a pleasure to each of them to listen to the words of counsel and advice they had had; and he hoped the suggestions which had been thrown out in the address would be taken to heart not only by the managers who were members of the Association, but also by those who were qualifying themselves to become managers.

Place of Next Meeting.

It was decided to hold the next meeting at Drogheda.

The meeting then adjourned for about three-quarters of an hour, during which time, on Mr. Whimster's invitation, they visited the gas-works. They were here hospitably received by Mr. and Mrs. Whimster in their new residence.

Papers and Discussions.

On the resumption of the business, the reading and discussion of papers was proceeded with. The first paper was by Mr. W. B. Featherstone, on "A Fifty-Feet Diameter Gasholder, with Specification, Quantities, and Estimate;" the second, by Mr. P. Hurll, on "The Manufacture of Fire-Clay Gas-Retorts, and the Advantages of having Standard Sizes." These, with the report of the discussions thereon, will be given next week; to be followed by a report of the conversational discussion on "Experiences in Purification" which brought the technical portion of the business to a close.

Vote of Thanks to the President.

Mr. Whimster said he thought the members could scarcely adjourn without acknowledging the able manner in which their worthy President had discharged the duties of the chair; and he had very great pleasure in proposing that they give him a hearty vote of thanks for his dignified and able conduct.

This was cordially agreed to, and the meeting terminated.

The Dinner and Excursion.

The members afterwards dined together in the Beresford Arms Hotel—Mr. Outon being in the chair.

On Wednesday, a number of the members and their friends enjoyed an excursion. The party journeyed to Warrenpoint by rail; and after lunch in the Beach Hotel there, they drove to Rostrevor, three miles distant, where some time was spent amid the beautiful scenery of the Mourne Mountains, the wooded eminences of which overlook Carlingford Bay. Tea was served on the return journey; and thereafter the company dispersed.

The meeting, on the whole, was a highly successful one—Mr. Whimster having made the best possible arrangements for all the proceedings; and the excursion, with the exception of the weather, which was showery, was most enjoyable.

SOCIÉTÉ TECHNIQUE DU GAZ EN FRANCE.

The Papers Presented at the Annual Congress.

In a previous issue of the JOURNAL (*ante*, p. 35) we gave an abstract report of the proceedings at the annual congress of the above Society at Nîmes. We now notice briefly some of the papers presented on the occasion.

At the congress of the Society in 1893, a communication was submitted by M. Bouron on the subject of M. Magot's regenerative system of heating retorts. In order to demonstrate the value of the system, he took as the basis of his calculations certain figures relating to the works at Lens, and showed that a transformed setting of six retorts resulted in an annual saving of 2914 frs., representing the expense of the alteration. The quantity of coke employed per day was 14·4 kilos. per 100 kilos. of coal carbonized. At Fontainebleau, however, with a Magot setting of nine retorts, the average was only 14·1 kilos. At that time, a trial of a converted setting of three retorts had not been made; and it was the results obtained with such ovens as these that M. Stucker now communicated to the members. A setting of three retorts at Brienon, which had been in use since the previous September, realized, according to the statement of the owner of the works (M. Dupuy) an economy of 25 per cent. in fuel—a very satisfactory result for an oven of this size. At the Fleurier works, there are two similar settings. Formerly all the coke produced was insufficient for heating purposes; and a notable proportion of coal had to be employed in order to work off the charges properly. There were then three hands employed. Now the production of coke is in excess of the consumption by 252 kilos. per day; and a single workman is sufficient to conduct the whole of the operations. M. Stucker estimates that the economy in labour and heating, without reckoning the saving effected in maintenance, will be equivalent to 6000 frs. per annum, or 1000 frs. per annum per retort. M. Bouron thought last year that the conversion of a setting of three retorts ought to result in an annual saving of 2500 frs. per annum, sinking fund charges deducted.

M. Maldant described a new prepayment gas-meter, furnished with a dial registering all the payments made by the consumer; so that a glance at the face of the meter shows at once his position in regard to the gas company. His indebtedness is recorded by the registration of the total consumption of gas; and the amounts standing to his credit are shown by the additional dial. The working parts are so carefully adjusted that the liability to error is stated to be practically *nil;* but should differences arise, they can be easily adjusted, as the figures will be available. Prepayment meters should not be simple distributors of pennyworths of gas; they should afford the consumer every facility for replenishing his store without having to give special attention to the matter. M. Maldant's meter is so arranged that the consumer can not only pay in advance for a pennyworth, but for 150 cubic feet of gas. Under the dial recording the total consumption, there is one showing the quantity of gas paid for, but remaining unconsumed. The inlet-valve is so arranged as not to close suddenly when the gas is nearly all used up, but gradually during the burning of the last 3 or 4 cubic feet. The consumer is thus warned, by the poorness of the light, that the supply must be renewed if he would avoid complete extinction. The distributor can be regulated on the spot in accordance with the price of gas; and the regulation is effected by a simple pressure-screw. By means of a special arrangement, coins smaller than that for which the meter has been regulated are rejected as soon as they are put in. Summing up the special features in this meter, they are: The registration of the consumption in the ordinary way; the indication of the prepaid gas remaining to be consumed; and the recording of the amounts paid by the consumer.

An account of an explosion of gas which occurred in the vicinity of some electric light cables was given by M. Gaston Gautier. The explosion in question took place in one of the streets of Nantes; and subsequently M. Jamin was instructed by the local Electric Light Company, as well as by the European Gas Company, to determine the cause of the accident. M. Gautier thought it would be interesting to the members to know the substance of the expert's report; and he reproduced it *in extenso*, with a few preliminary observations on the subject of the canalization employed. The three-wire system is in use; the wires being naked, and resting on porcelain supports. The branch wires are insulated. The contract under which the Electric Light Company work compels them to put a cable under each footpath, except in narrow streets. It was in such a case as this that the explosion occurred. The street having but one footpath, only one main had been laid; and the branch which crossed the street was formed of two insulated wires, separated, and placed in a cast-iron conduit having lead joints. At the spot where the explosion seems to have originated, a branch electrical service crossed the street in a cast-iron pipe about 3¼ inches in diameter. The principal canalization having been uncovered at this point, it was found that the negative wire of the branch was broken at the entrance to the pipe. A trench opened in the direction of the pipe revealed right and left—about 16 inches on one side and 5 feet on the other—two lead pipes conveying gas into the neighbouring houses. Each of these pipes was enclosed in a box made of deal, which had been steeped in sulphate of copper, serving as an insulator. But the vertical sides of one of these boxes had been sawn at a certain spot, doubtless to allow for deflection; and there was a rupture at the junction of the two parts of the other box, which made connection. It was precisely at these two places that large holes were found extending lengthwise along the pipe. This being the state of affairs, what happened? Undoubtedly, a very considerable escape of gas took place through the perforations, and, following the line of wooden troughs, reached the electric light mains, and formed with the air contained therein an explosive mixture which was probably fired by the electric current. The perforations must have been formed very quickly, and have preceded the explosion by only a short interval, as the openings were too large to have existed any length of time without giving indications of their presence by allowing a large escape of gas through the soil or in the consumer's house. It therefore appears reasonable to admit that the perforations were produced spontaneously under the action of an electric short-circuit, which is easily explained by the initial action of a resistance or of a contact which caused the fusion of the negative wire of the service. The fatal consequences of this first rupture may be readily appreciated. M. Jamin pointed out the precautionary measures to be taken to prevent accidents of the character dealt with. In the first place, the gas and electric light conduits should be kept as far apart as possible; next, they should be protected by some insulating coating. Then earth currents should be avoided; and the regulation prescribing that a main should be laid under each footway should be observed as far as possible. As the result of the report, the following regulations were agreed to by the parties: No work to be done by either of the Companies in the vicinity of the mains of the other without due notice being given; the Electric Light Company to substitute earthenware casings for those of cast iron for their branch services; and branch gas service-pipes in the neighbourhood of electric light mains to be laid in wooden boxes into which there had been run natural bitumen—not pitch, which is not an electric insulator.

M. Ph. Delahaye submitted a communication furnishing particulars on the subject of the distribution of light and power by electricity in the large towns of England and Germany. The author endeavoured to lay before the members replies as authentic as possible to the following questions: How is a distribution of electric current at present arranged by steam engines, continuous-current dynamos, and batteries of accumulators? What are the results to be expected from the working of central stations for the supply of electricity? M. Delahaye showed by a table how the electric current produced is employed between the point of distribution and that of consumption, and, consequently, what loss has to be anticipated under normal conditions. The case taken was that of one of the London Companies; and the total annual production was thus accounted for: Paid for by consumers, 85·24 per cent.; used on works, 1·94 per cent.; lost in accumulators, 1·06 per cent.; lost in distribution, 10·48 per cent.; unaccounted for, 1·28 per cent.

M. Chamon gave a description of a pressure-regulator which could be automatically weighted; and M. Frère introduced the Delmas reflector and recuperative lamp. Both of the latter are applicable to ordinary lanterns used for public lighting; and they are stated to increase very considerably the light afforded. M. Chevalet described a new form of purifier designed by him, having separate moveable compartments containing the purifying material, which is spread upon perforated plates. It is claimed for this purifier that it will remain in action three times as long as those constructed upon the ordinary system.

THE BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

Sectional Presidential Addresses—Research and Technical Training.

In the last number of the JOURNAL, reference was made to the opening of the meeting of the British Association in Oxford on the 8th inst. On the following day, the work of the various sections commenced with the delivery of the customary presidential addresses. There was nothing in these discourses bearing directly on the gas industry; but certain remarks on the subjects of research and technical training have sufficient general interest for our readers to justify reproduction.

In his address to the Chemical Science Section, Professor Harold B. Dixon, F.R.S., dealt mainly with the researches of Boyle, Hooke, and Mayow into the phenomena of fire and water, which were carried out at Oxford in 1660 and the following years. These, he remarked, constituted the first school of scientific chemistry; and it was interesting now to consider what this school accomplished, wherein it failed, what led to its sudden rise and decline, and what were the lessons of that rise and fall. The cramped philosophy of the Middle Ages had in alchemy a fitting colleague—with its mysticism, its sordid ideals, its trickery, and its arrogance. The revival of learning was thus an emancipation of the mind; and in the new freedom the sciences of mechanics, physics, and chemistry arose. The first necessity for progress was enlightenment; while the second was experiment. In the year that Francis Bacon died, Robert Boyle was born. The common pursuit of experimental inquiry, and the need for constant criticism and

discussion among its followers, led to the foundation of scientific societies. Such societies sprang up in Florence and Padua, in Paris and Oxford. Among these the Philosophical Society of Oxford had played no unimportant part. For one thing chemists were grateful, and Oxford might feel proud—that there, under her influence, first grew up the idea that chemistry was no mere drudge of medicine, but a science to be studied purely for itself. Boyle's writings contained the record of numerous important chemical observations—*e.g.*, the synthesis of nitre, and the preparation of nitric acid by the distillation of nitre with oil of vitriol. He discovered several of the delicate tests still in use—for example, solution of ammonia as a test for copper, silver nitrate as a test for chlorides, gallic acid as a test for iron. Like Van Helmont, Boyle recognized difference in gases; but he did not distinguish them as being something different in kind from air. He prepared hydrogen by the action of hydrochloric and sulphuric acids on iron; but his chief concern was to show that the new gas was compressible, and was dilatable by heat—in other words, that it was really air. His observations contained the first undoubted description of hydrogen, and the first method devised for collecting and examining freshly-prepared gases. The genius of Robert Hooke was in sharp contrast with that of Boyle. Quick, restless, imaginative, he sprang from discovery to discovery. One could hardly name a discovery of this age which Hooke had not in part anticipated and claimed as his own. In 1665, Hooke published in the "Micrographia" a description of flame and the phenomena of combustion which perhaps had never been surpassed. How far he was indebted to Boyle appeared from the records of their co-operation. Mayow went farther, and distinctly showed the dual nature of the air. To him his successors owed some fundamental facts in chemistry; but the limits of his work were obvious. He detected the existence of what was called "oxygen gas" in the air; and he demonstrated some of its most remarkable properties. He did not isolate the gas, or show what became of it in combustion; nor did he always distinguish between the gas itself and the heat produced by its action. But the advance he made was extraordinary—not so much in the conclusions he drew as in the experiments and arguments on which he founded them. The Oxford School of Chemistry was a school of research. Boyle gave no instruction in the ordinary sense; and, indeed, he had no official connection with the University. But he thought that instruction in chemistry should be given there; and he brought over a chemist from Strasburg, and set him up as a lecturer, with rooms next his own and the use of his laboratory. Having referred to the present position of chemical study, and expressed the opinion that the elements of physic and chemistry should form a necessary part of a liberal education, Professor Dixon pointed out two mistakes which he thought had been made in regard to the teaching of science. He said he considered that, by the establishment of science scholarships, encouragement had been given to too early specialization at school; while at the University the undergraduates had been overburdened with a multitude of facts they could not retain. The effect of these mistakes was that manufacturers, as a rule, did not care for University graduates. He could not blame them; for one could not guarantee that the men sent out with honours in chemistry could attack a new problem, work out new processes, or prepare new dyes. German manufacturers, on the other hand, preferred a University graduate, for they had in their degree a guarantee that the student had successfully attacked some unknown problem, and added to the store of knowledge.

Proceeding next to deal with the art of research, Professor Dixon spoke as follows: The country cries out for technical instruction. It is not afraid of spending money; indeed, many well-meaning bodies are spending—and in some cases, I fear, wasting—money with a prodigal hand. And what, after all, is the great need? Speaking for the subject I know best, I say unhesitatingly that we want scientific chemists who can and will make discoveries. We want men trained not only in what has been done, but taught how to set about winning new knowledge. The Universities, I urge, should teach the art of research. This is what is wanted; and this, as all experience shows, is what the Universities can do better than anyone else. And no exorbitant amount of time need be demanded for this purpose. If the student has learnt the elements of science at school, three years at most should suffice for the preliminary degree course. The graduate, armed with the necessary manipulative skill, would then start research work (under proper guidance) as the second and more valuable portion of the University training. And here the new research degree—by whatever name it may be called—may give us the most valuable help. I hope that serious work will be demanded for it, and that the research course will become the recognized avenue to science fellowships and lectureships in the University. Two years would show what the man had in him. In that time, either he would have proved himself no chemist, or he would have made some useful advance in our knowledge, and would have secured a testimonial of fitness such as no examination could confer. Five years in all—the minimum time now laid down for a medical qualification—would surely not be too much to ask for the chemist's training. No extra expense need be incurred to carry out this plan. Some of the college scholarships at present offered on entrance might be reserved for research studentships on graduation. The studentships should be the reward of the successful undergraduate career. At Owens College, our most successful endowment in chemistry has been the Dalton Scholarship, awarded for a research done in the college laboratories. In the Victoria University, we have lately founded scholarships for the encouragement of research, which are awarded on the results of the final examination in the several Honours Schools. The winners are entitled to hold their scholarships at any University at home or abroad where they can continue their special studies. I plead, then, for greater encouragement of chemical research in Oxford. Make it part of the normal course of training for everyone wishing to be a chemist in fact as well as in name.

In the Geology Section, Mr. L. Fletcher, F.R.S., summed up the more important results which have been arrived at in mineralogy since the publication of the report by Professor Whewell on the state of knowledge in 1832, and contrasted the encouragement given to the study of minerals abroad with the neglect of it in this country—taking Germany as an illustration. He gave the names of 26 workers who are now distinguishing themselves by mineralogical research. He said they were most of them University professors of mineralogy; and all of them held important positions as teachers of the subject. They were furnished with laboratories and instruments necessary for the teaching of practical work. On the other hand, in the Universities of England, Wales, Scotland, and Ireland, there were only two professorships of pure mineralogy; and these were paid on a lower scale than their brother professors. Mr. Fletcher suggested the importance to a highly civilized country of having within its own borders a group of men who would make themselves familiar with all that was being done and had been done on the subject, would do what was possible to fill up the gap in the science, and would make the results available for those who had not the opportunity to carry out so complete and original a survey for themselves. He recommended that by some means each University should be enabled to endow a Professorship of Mineralogy in such a way as to attract the most capable men to the study of the subject; and that the other Universities should follow the example lately set by Cambridge, which encouraged the students of physics, chemistry, and geology to acquire an elementary knowledge of mineralogy and crystallography, and gave credit for that knowledge in the examination for a degree.

In the Mechanical Science Section, the address of Professor A. B. W. Kennedy, F.R.S., was devoted to a consideration of the critical side of mechanical training—that is to say, the training of a man to think about a subject, to write upon it, and to come to a rational decision, by exercising a critical sense of proportion which could be best developed by a course of quantitative experimental work in an engineering laboratory. After observing that an engineer is a man who is continually called upon to make up his mind irrevocably in a very short time—generally about one-tenth of the time which he would like to give to the subject—Professor Kennedy pointed out that there is an essential difference between the problems of the mathematician and those of the engineer. In pure science and mathematics, there was, he said, little room for the critical faculty. The result was either right or wrong. In engineering, there might be many solutions; and the critical faculty must be rapidly applied to the problems, their statement, their condition, and all the possible solutions. The literary faculty—the power of expression—was also of great importance, as it necessitated clear thinking and a grasp of the environment of the question, with a due sense of the proportion of its component parts and of the forces affecting it. He went on to say that probably the best special education in proportion which a man could have, was a course of quantitative experimental work—meaning by this phrase something much more than mere qualitative work. Here, he thought, came in the usefulness of the engineering laboratory. It was necessary that the training should be not only in absolute, but in relative measurement—the latter being quite as important as the former. In most engineering matters, the conditions were, unfortunately, of a most complex kind; so complex that the problems were incapable of any solution sufficiently exact to satisfy the mathematician or the physicist. The temptation to treat these problems as the mathematician treated those with which he dealt—viz., to alter the assumed conditions in order to get an exact solution—was a very strong one. He was afraid it was often strongest in those engineers who were the best mathematicians. It was a temptation, however, steadily to be resisted. Their first duty was generally to find out the conditions. If they were disadvantageous in fact, to alter them if they could be altered; but not to ignore them because they were inconvenient. They had then to find out the extent to which the known conditions permitted any exactness of solution at all. Finally, they had to keep this in view as a measurement of the highest accuracy which was attainable. To work out certain branches of the problem with such minuteness as to give apparently very much greater accuracy than this was not only useless, but was apt to be positively misleading as conveying an impression of an accuracy which had no real existence. Having dealt in detail with the work of an engineering laboratory, Professor Kennedy concluded his address with the following remarks on mathematics and engineering: In spite of many solemn warnings which I have lately received in the Press against the monstrous idea that a presidential address should contain any individual opinions, I venture to repeat here what

I had lately an opportunity of saying before a Royal Commission—that, in cases where a University or a University College takes in hand the preparation of engineers (and I hope that such cases will grow in number), they should provide for them special training in mathematics, and probably also in physics, distinct from the general training in these subjects most suitable for degrees. I say this with the full knowledge that I may be accused of wishing to degrade the purity of scientific work, and, at the same time, with the full knowledge that I have no such wish. On the contrary, this special training is the only means by which the rank and file of us will ever know any mathematics at all. And I can say from my own knowledge that, if only we can be made what I may call mathematically articulate beings, we shall be able to repay the kindness by placing before the man of pure science problem after problem of transcendent difficulty, of immense interest, and having no single drawback whatever, except that its solution may really be "useful;" and, after all, this need not be brought too prominently under notice.

AMERICAN TESTS OF WELSBACH BURNERS.

The number of *Progressive Age* for the 1st inst. contains the following article, by Dr. E. G. Love, the Gas Examiner for New York City, giving the results of some tests of Welsbach incandescent burners carried out by him with coal gas and water gas. The article will be interesting in connection with the paper read by Mr. Galloway at the recent meeting of the North British Association, and the discussion thereon.

In 1888, I was requested to make photometrical tests of several of the Welsbach incandescent burners which I believe were then first being placed upon the American market. The average of a large number of tests of six of these burners was 9 candles per cubic foot of gas consumed. Since that time, the burner has undergone some changes; and it has been so much improved that its efficiency now is about twice what it was six years ago. The most noticeable improvements are the greater stability of the mantle, and the change from a bluish to a yellowish tone in the light produced.

I recently obtained six of the latest form of these burners, and subjected them to a great many tests, both with a high candle power water gas and also with a mixture of water gas and coal gas. The tables which follow, while they contain only a portion of the tests made, fairly represent the results obtained with the different burners under varying conditions of gas and air supply.

As the mantles do not emit equal amounts of light in different directions, the burners were so mounted that they could be turned on the burner pillar by means of a ground joint; and measurements were made in three directions, 120 degrees apart—the surfaces exposed between the rods which support the shade-holder being successively turned towards the disc. A number of observations were made in each position of the mantle, and the average was taken.

In order to so adjust the supply of gas and air as to produce the greatest luminosity of the mantle, advantage was taken of the light reflected from a piece of white cardboard placed about a foot from the burner; the eye being protected from the direct light from the mantle by a piece of coloured glass. The cardboard was, of course, removed during the tests. Any attempt to make this adjustment by looking at the mantle while incandescent would entirely unfit the eye for observations for some little time. The pressure of the gas supply was practically uniform—about 2 inches during each series of tests; but a governor attached to the meter was used when it was desired to regulate the quantity of gas passing to the burner.

For convenience, the burners are numbered 1 to 6; and the letter placed after the number of the burner indicates either a duplicate test, or a second test under altered conditions.

The results recorded in Table I. were obtained with a water gas which gave 30·50 candles by the flat-flame burner, or 6·1 candles per foot of gas. In each test, the supplies of gas and air were carefully adjusted so as to produce the greatest amount of light, as judged by the reflection from the white cardboard. After the first test (A) had been made, the gas and air were readjusted, and a second test (B) was made.

TABLE I.

Burner.	Consumption in Cub. Ft. per Hour.	Candle Power.	Candle Power per Foot of Gas.
No. 1 A	1·968	48·74	24·77
„ B	1·800	43·83	24·35
No. 2 A	2·000	47·11	23·55
„ B	1·884	44·02	23·36
No. 3 A	1·850	44·47	24·04
„ B	1·870	43·10	23·05
No. 4 A	2·000	48·66	24·33
„ B	1·890	42·81	22·65
No. 5 A	2·050	41·71	20·35
„ B	2·010	38·62	19·21
No. 6 A	2·010	44·28	22·03
„ B	1·980	42·13	21·28
Average	—	—	22·75

Table II. shows the effect on the candle power of the burner of changing the relative amounts of gas and air admitted. In the tests marked A, the gas was cut down by the governor, and the air supply adjusted to produce the best illumination of the mantle; in those marked B, the gas was burned under the full pressure of 2 inches, and the air-regulator opened wide; while in those marked C, the gas was burned under the full pressure, but the supply of air was cut down by the regulator until the mantle gave what was judged to be its greatest illumination. In tests A and C, the Bunsen flame, with the mantle removed, presented a very green cone; and the flame was, in most cases, very unsteady—showing that the proportion of air to gas had about reached its limit, and that any increase in the air supply would cause the burner to light below, as was noticed in all the tests marked B, where the air-regulator was wide open. However, the construction of the burner is such that, when the mantle is in place, there appears to be no tendency of the flame to light below, although it is sometimes rendered unsteady by the excess of air.

TABLE II.

Burner.	Water Gas = 29 Candles.			Mixed Gas = 23 Candles.		
	Consumption, in Cubic Ft. per Hour.	Candle Power.	Candle Power per Foot of Gas.	Consumption, in Cubic Ft. per Hour.	Candle Power.	Candle Power per Foot of Gas.
No. 1 A	2·14	43·81	20·47	2·46	40·84	16·60
„ B	2·46	43·33	17·61	2·90	41·70	14·38
„ C	2·48	46·83	18·88	2·93	44·23	15·10
No. 2 A	2·07	49·05	23·70	2·36	47·42	20·09
„ B	2·35	39·82	16·95	2·78	47·42	17·06
„ C	2·47	51·75	20·95	2·78	49·10	17·66
No. 3 A	2·23	47·35	21·23	2·39	43·74	18·30
„ B	2·53	42·67	16·87	2·75	41·24	15·00
„ C	2·52	44·15	17·52	2·76	49·74	18·02
No. 4 A	2·20	50·00	22·73	2·44	52·67	21·58
„ B	2·62	44·63	17·04	2·89	48·13	16·65
„ C	2·67	56·16	21·03	2·88	54·37	18·88
No. 5 A	2·44	45·91	18·82	2·82	46·17	16·37
„ B	2·79	44·56	15·97	3·07	43·51	14·17
„ C	2·81	48·01	17·08	3·07	47·43	15·45
No. 6 A	2·13	40·83	19·17	2·38	43·14	18·12
„ B	2·31	33·35	14·44	2·45	32·97	13·46
„ C	2·34	46·39	19·82	2·45	43·29	17·67

	Water Gas. Candle Power.	Water Gas. Candle Power per Foot of Gas.	Mixed Gas. Candle Power.	Mixed Gas. Candle Power per Foot of Gas.
Average of six tests A	46·16	21·02	45·66	18·51
„ „ B	41·39	16·48	42·49	15·12
„ „ C	48·88	19·21	48·03	17·13
Loss of light per foot of gas in tests B compared with A.		21·6 per cent.		18·3 per cent.
Do. in tests B compared with C.		14·2 „		11·7 „

In the construction of the burners tested, a check is introduced, consisting of a diaphragm with three very small openings, through which the gas is obliged to pass before reaching the point of ignition. I understand that the Company manufacturing these burners aim to supply them in a form adapted to the gas they are intended to burn; and doubtless the main point of difference between those for coal gas and those for water gas consists in the size of the openings in the diaphragm. It is not possible, however, to obtain anything like a satisfactory adjustment in this way, since the pressure is an ever-present and unknown factor in the problem.

The tests recorded in Table III. were made to ascertain to what extent changes of pressure would affect the service of the burner. Only two burners—Nos. 5 and 6—were tested; these having shown the maximum and the minimum consumption in previous tests. The pressures given in the table were taken by a gauge placed just below the burner, and while the latter was in operation. The consumption in each case depended, of course, upon the pressure; but the air supply was regulated to give the maximum amount of light from the burner. Water gas of 30·4-candle power was used in these tests.

TABLE III.

Burner.	Pressure, Inches.	Consumption, in Cubic Feet per Hour.	Candle Power.	Candle Power per Foot of Gas.
No. 5 A	0·8	1·61	28·59	17·76
„ B	1·4	2·15	49·84	23·18
„ C	2·2	2·71	54·61	20·15
No. 6 A	0·8	1·26	14·41	11·44
„ B	1·4	1·73	40·03	23·14
„ C	2·2	2·15	49·88	23·20

The tests recorded in the foregoing tables show that the Welsbach burner, in its present form, develops an unusual amount of light per cubic foot of gas consumed. Its efficiency depends upon the degree of intensity to which the mantle is heated; and anything which lowers this temperature will naturally result in impairing the efficiency of the burner. Hence the introduction of an unnecessarily large amount of air to the Bunsen flame is a detriment; and this leads me to say a word about the air-regulator, which is a prominent feature of the present burner.

Those who have examined this burner in use cannot have failed to notice its sensitiveness to any changes in the gas and air supplies, especially the latter. Moreover, the results given in Table II. show that, by opening the regulator wide, there is a loss of from 12 to 14 per cent. in the light yielded, per cubic foot of gas, compared with that obtained when the regulator is adjusted to the greatest efficiency of the burner; and that this loss amounts to from 18 to 21 per cent., if we may assume that the consumption is cut down somewhat at the stopcock when the pressure warrants it.

In the burners tested, it was found that, while the regulator could be turned through about 60 degrees, all that was ever necessary, in order to obtain the best result, was to turn it from 18 to 20 degrees, and that the regulator was not really open until it had been turned about 6 degrees. In other words, this adjunct of the burner admits very much more air than there is any necessity for, with the result of diminishing the efficiency of the burner, and in some instances of producing a very unsteady light. Moreover, it is so placed that a consumer, in handling the burner, might inadvertently open or close the regulator, and thereby interfere with the action of the burner, and this without knowing the cause of the difficulty. In the older form of this burner, the air supply for the Bunsen flame was admitted by a circle of openings, which could be closed to any extent by a moveable collar; and the whole was protected by a metal cap. In this particular, I think the older burner is much to be preferred to the present one.

In conclusion, it may be said that the results here recorded show the illuminating power of the Welsbach burner under the most favourable circumstances. It is hardly to be expected that the average consumer will obtain such good results, though this is not impossible with a proper amount of care. Whether or not the burner will maintain this high degree of efficiency can only be determined after some use.

Since writing this article, I have examined a new form of air-regulator devised by the Company, which I understand is to replace the one heretofore sent out with the burners. The new appliance is somewhat similar to the older one, but is of better appearance, and is so arranged as to obviate to a great extent the danger of inadvertently opening or closing the regulator when handling the burner. At the same time, the space for the admission of air, when the regulator is open, is about twice as large as in the older form; and if my criticism of this feature of the older burner is correct, it will apply with still greater force to the new one.

Lectures on "Gas Manufacture" at New Cross.—A course of lectures on "Gas Manufacture" will commence on Friday, the 28th prox., at the Goldsmiths' Institute, New Cross. They will be given by Mr. A. G. Bloxam, F.I.C., and Mr. W. J. Lincham M.I.M.E., and be illustrated by diagrams and experiments. We understand that the course will be inaugurated by Mr. G. Livesey.

The Literature of Sewage Treatment.—At the recent congress of the British Institute of Public Health in London, Mr. Kaye Parry gave a very complete history of the progress of science in dealing with sewage effluents, and epitomized the official literature on the subject, which is very voluminous. It includes the report on the condition of the Thames by the Government Referees of 1857; three reports of the Commission appointed in 1864 to inquire into the best means for remedying the pollution of rivers; six reports by a second Commission appointed in 1868; the report of the Committee of the House of Lords on the Rivers Pollution Bill of 1873; two Blue Books in 1882 and 1884 from the pen of Dr. Angus Smith; two reports of the Commission of 1884 on Metropolitan Sewage Discharge; and the report of the Royal Commission on the Metropolitan Water Supply, issued in September last year.

A New Constituent of the Atmosphere.—In the Section devoted to Chemistry and Mineralogy of the British Association, on Monday last week, an important announcement was made by Lord Rayleigh, on behalf of himself and Professor Ramsay, of the discovery of a new constituent of the atmosphere. His Lordship has been for some years engaged upon the determination of the densities of various gases; and lately, in conjunction with Professor Ramsay, he has succeeded in isolating from atmospheric nitrogen, by two distinct processes, a second inert ingredient denser than true nitrogen. In the first method, air mixed with oxygen was submitted to electric sparks in presence of alkali, until no further contraction took place. The excess of oxygen was then absorbed by pyrogallol. That the residual gas was not nitrogen was inferred from the manner of preparation, and from the appearance of its spectrum. A second method, giving much larger quantities of the new gas, depends upon the removal of nitrogen from deoxygenated air by passing it over heated magnesium. When this process was allowed to continue, the density gradually rose to 14·88, 16·1, and finally to 19·09. At this stage the absorption appeared to have reached its limit—indicating that the new gas amounts to about 1 per cent. of the nitrogen of the atmosphere. When the gas thus prepared was sparked with oxygen, there was little or no contraction. The above-named distinguished scientists have found that no liquefaction occurs when the gas is compressed at atmospheric temperatures.

THE GAS INDUSTRY IN THE UNITED STATES.

By Herr W. von Oechelhaeuser, of Dessau,
General Director of the German Continental Gas Company.

A Lecture delivered at the Meeting of the German Association of Gas and Water Engineers at Carlsruhe, June, 1894.

(*Continued from p.* 326.)

II.—American Gas-Works as Central Stations for the Supply of Light.

In passing from central gas-works for the supply of heating to those for the supply of lighting gas, the European observer necessarily notices water gas first of all; this being the subject in which, as a matter of course, he is most interested. As was to be expected, the production of carburetted water gas may by this time be regarded as a fully solved problem, both technically and, as far as America is concerned, economically also. Personally, I have the greatest confidence in the system devised by Mr. A. C. Humphreys, the former Managing-Director of the United Gas Improvement Company of Philadelphia, in co-operation with Mr. A. G. Glasgow, which is largely represented by numerous plants, scattered over North America. This system and that of Professor Wilkinson (for light carburetting oils only) appeared to me to be particularly reliable and workable, quite apart from the good results it is certainly possible to obtain also by other arrangements. It would, however, be a mistake to suppose (and Professor Bunte has not failed to refute the notion) that the reason why water gas has become so rapidly and so widely popular within the last few years in America is to be found in any appreciable reduction in the cost of the manufacture of this gas as used for lighting. The fact is I have found that, in most establishments manufacturing water gas and coal gas, the average cost of both, taking in everything, all the year round, while varying according to the price of the coal and oil, was, upon the whole, practically the same. To give but one striking example, which illustrates the fact that, even in America, the choice between water gas and coal gas is entirely dependent on local conditions, I may mention that in Cleveland, on Lake Erie, where one of the head-quarters of the large petroleum trust known as the Standard Oil Company is situated, and where, therefore, carburetting agents are not wanting, and may be procured at a minimum cost for transport, not one cubic metre of water gas, but solely coal gas, is produced; the reason being that the bye-products obtained in the manufacture of coal gas—viz., coke, tar, and ammonia—command good prices in that locality. The sale price of lighting gas* on this side of the Rocky Mountains generally varies between 14 and 24 pf. per cubic metre (from 4s. to 6s. 9d. per 1000 cubic feet); being, therefore, very much the same as the price at which gas is supplied in Germany. Only a few years ago these prices were considerably higher.

It was, however, extremely pleasant to notice how well the joint production of coal gas and water gas in the same works, and their simultaneous conveyance through the same network of pipes, was managed; also how readily the two kinds of gas would mix in any desired proportions; and, lastly, how favourably this facility of mixing affects not only the manufacture but also the sale of the gas. The fact is that water gas, if burnt alone, only gives a short, pointed, and intensely hot flame, such as is least suited for heating cooking utensils; whereas the mixture of coal gas and water gas usually supplied by most establishments produces a longer flame, the temperature of which is not quite so high. Similarly, for use in gas-engines, this mixture, which is known as "commercial gas," is far preferable to pure water gas, which burns away too rapidly in the engine, and is too liable to self-ignition.† Besides, by mixing coal gas with water gas, the danger arising from the inodorousness of the latter is averted in the simplest possible manner.

Thus you will see that we have no reason whatever to be afraid of water gas, or to abuse it. This affords me an opportunity of referring to a remark of Dr. H. Strache, of Vienna, who, in a recent issue of our *Journal*,‡ commented on my Berlin lecture. While Dr. Strache made a number of valuable observations in reference to my lecture, I must say that I think him to be somewhat mistaken when he upbraids me for what he calls my "too stringent criticism of water gas." I therefore take the liberty of correcting the few slight errors which he has made in this connection, in a short note appearing in the supplement to this paper, lest I should be accused of inconsistency by those who peruse my present remarks on water gas. Indeed, it was at that time my duty to state that "Auer's incandescent bodies or mantles were unsuited for water gas; their power of emitting light being very quickly impaired by chemical combinations." Well, that was saying no more than what Dr. Strache himself, in his lecture at Vienna, delivered six months later, expressed thus: "But that method of illumination"—meaning incandescent burners fed with non-luminous water gas—"is attended with this characteristic

* A remarkable fact is that, at the time of which I am speaking, Cleveland, where no water gas is produced, was the very place, of all those I visited, where gas was cheapest.

† I may here mention that, even in gas-engines operated by natural gas, the igniting flame has to be fed with coal gas, owing to the fact that natural gas is too readily extinguishable, while it can only be ignited with comparative difficulty.

‡ The *Journal für Gasbeleuchtung*.

inconvenience, that the burners in a very short space of time lose their illuminating power, and have to be renewed; hence the invariably defective nature of the light as supplied hitherto by water gas." This, then, according to Dr. Strache, was the correct view to take as recently as May last year. However, I certainly did not say "that water gas would never become fit for use for incandescent gas lighting purposes," as Dr. Strache, in his last essay, alleges that I did. Dr. Strache, continuing, makes the very satisfactory statement that the assertion of mine regarding the unfitness of Auer's light for use in connection with water gas "may at present be applied with justice only to the unpurified ferriferous gas; but that even this gas, on being applied to Auer's incandescent bodies or mantles, may be said to have given results which, upon the whole, were not altogether unfavourable—in fact, in many places it is actually being so used at the present time. Water gas which is free from iron now produces light of such intensity as to exceed by two or three times the light given by Auer's lamp with coal gas; while the intensity of this light decreases in a far less proportion compared with that of the coal-gas light." If Dr. Strache's invention should prove a success, and if the statements which Herr H. Dicke made at our last meeting, as to the improvements in the Fahnehjelm magnesia comb, &c., be verified upon being tested on a somewhat large scale in actual practice, this will simply amount to the practical realization of one of those contingencies which I had in view when I said "that as soon as these economical conditions are fulfilled, and certain other requirements, in connection with the method of production, &c., are met, in a way favourable to the adoption of water gas, the coal-gas industry will turn its attention to it." This would, indeed, bring the cheaper non-luminous water gas more within our reach; whereas, hitherto, nearly all the financial difficulties which had to be overcome in Germany, and the many inventions which were produced, had for their primary object the imparting of lighting power to, or carburetting, water gas. Moreover, in addition to the removal of the iron from the water gas, and in the hope that the purified water gas will not become "ironed" again by mains which have no good asphalte coating inside, another far more difficult problem would, of course, remain to be solved—viz., the attainment of such a degree of perfection in the construction of the incandescent gas-burners, that all flat-flame and Argand burners, wherever employed, may be replaced by them. But until this further progress is made, the present methods of affording a supply of illuminating gas through the medium of flat-flame and Argand burners cannot be discarded.

At the same time, the outlook being what it is, the question regarding the advisability or otherwise of mixing together lighting gas and water gas, as is done in America, may not inappropriately be discussed in Germany, since it appears, or it is to hoped, that water gas no longer interferes with the practical performance of Auer's method of lighting, so that it may with all the more reason be taken for granted that no such interference need be apprehended where coal gas and water gas are mixed. Besides, an additional criterion, which may serve as a guide in forming our conclusions, is furnished by the fact that benzol—which is now obtainable, by a new method, in abundant quantities, as a bye-product of the manufacture of coke, and which Professor Bunte has repeatedly recommended for this purpose—is a readily available carburetting medium for Germany, which may render good service, if non-illuminating heating gas were to be diluted with water gas, making up for the deficient intensity of its light, at least so long as this be necessitated by the employment of Argand, regenerative, and other similar burners, instead of using in the future only incandescent lights supplied with non-illuminating heating gas.*

The recent improvement to which I have referred as having been realized in the purification of water gas, with a view to its employment in incandescent burners (supposing it is found to be practicable both from the technical and the economical point of view), seems, in my opinion, to indicate that we should probably be mistaken in copying the Americans by manufacturing lighting gas from 18 to 28 candle power, instead of gas averaging 15 or 16 candle power, such as we have in Germany—*i.e.*, increasing the illuminating power of the gas, on the average, about one-and-a-half times. On the contrary, we hope to diminish our illuminating power more and more with the further perfection of incandescent burners. A circumstance which may have had something to do with the increase of the illuminating power of gas in America is that all incandescent burners, including the older burners of both Fahnehjelm and Auer, proved failures there. Indeed, this latter point is of such paramount interest that I may, perhaps, be permitted to dwell upon it a little longer. The two above-mentioned older types of incandescent burners, as soon as they made their appearance in America, were so eagerly welcomed that, when they subsequently proved defective in practice, the resulting reaction was proportionately severe. So much was this the case that, in the course of my last year's American tour, I did not come across a single place—even including such centres of culture as New York and Boston—where Auer's new burners were in use to anything like an appreciable extent; while in Chicago, as I have before mentioned, the last extensive trial made with Fahnehjelm's magnesia combs had just been given up. The more eminent specialists in the gas industry with whom I was enabled to become acquainted—Mr. Eugene Vanderpool, of Newark, and some others—were the only persons who actually kept a few of the new incandescent mantles on Auer's system in use, by way of trial.

Germany may, therefore, be congratulated upon the fact that the gas managers protected the consumers from too rash an introduction of any of the older forms of incandescent burners above alluded to; thereby more effectually ensuring the quick adoption of the improved mantles. This, too, is one more proof in confirmation of the well-known rule that nothing can more seriously injure an invention than its premature introduction into general use, when either the invention itself is not yet "finished," or when, economically speaking, the market is still unprepared to receive it. And yet it seems pretty certain that, in America, as well as elsewhere, incandescent burners will be the burners of the future, and that there are no difficulties (peculiar to American life) that are likely to impede their introduction. I found evidence bearing out this view when visiting the city of Montreal, where an intelligent and pushing Company—the Incandescent Gas-Light Company, managed by Mr. Granger and Professor Bell—started for the purpose of working Auer's burners, had succeeded, in the brief space of three-and-a-half months, in disposing of about 12,000 incandescent lamps. There seems, consequently, to be little doubt that the incandescent gas-light will have another chance of gaining access to America; and it will conclusively show by-and-bye the uselessness of such great intensities of light as flat-flame and Argand burners still demand.

To convey an idea of the remarkable degree to which the illuminating power and durability of the Auer burners have already been recognized in Germany (they having, indeed, far exceeded our original expectations), I have extracted some statistical data on the subject from the returns of the German Continental Gas Company, and have inserted them in the supplement. It is, however, to be earnestly hoped that, in this inventive age, the bold anticipations cherished in regard to the further improvement of the incandescent mantles may be verified at no very distant period, so that we may soon be in a position to produce a bright light, wherever it may be required, by means of an economical gas not luminous in itself, and perhaps, at some future time, to exchange the unreliable subjective photometer, operated by gas-burners constructed on the old system, for the sure objective calorimeter! *

(*To be continued.*)

Coal in Ireland.—It is reported that a seam of bituminous coal, 5 ft. 11 in. thick has been struck at Dungannon, Ireland. The depth at which the seam was discovered is 188 yards from the surface.

Pamphlets on Carburetted Water Gas.—Messrs. Humphreys and Glasgow have forwarded to us copies of a reprint of the paper on "The Relation of Carburetted Water Gas to the European Gas Industry in 1894," prepared by Mr. A. M. Paddon for reading at the last meeting of the Incorporated Institution of Gas Engineers, and a pamphlet prepared by themselves on the general subject of "Carburetted Water Gas," with illustrations of various plants which have been erected by the firm. The bulk of the matter contained in the pamphlets has already appeared in our columns; but the convenient—and we may add exceedingly tasteful—form in which it is now presented will lead to numerous applications to the authors for copies. We have lately mentioned that Mr. Humphreys intended severing his active connection with the United Gas Improvement Company, in order to devote his entire attention to the affairs of his own firm. This took place on the 31st ult.; and as from the 1st inst. the business will have the undivided services of its founders. In recording this fact, the *American Gaslight Journal* points out that "the new firm fairly seeks the whole gas world for its field, since its offices are in New York and in London, England;" and our contemporary adds that "the gas engineers of the latter country have already felt the impress of its prowess."

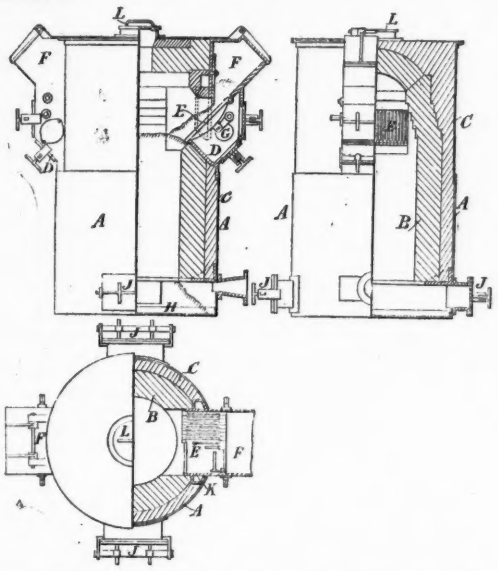
* The experiments made in Dessau in the months of December, 1893, and January, 1894, in which benzol was used for carburetting, and a repetition of which in a new apparatus (which has in the meantime been constructed) will soon take place, have given very favourable results as regards cost; yet the exact extent to which benzol condenses in the pipes is still an open question. However, from the interesting report of Dr. E. Schilling read at the meeting at Carlsruhe, it would appear that the practical experiments made in Munich have also shown satisfactory results as to condensation.

* Professor Dr. A. Slaby, in a most valuable essay, entitled "Calorimetrical Investigations into the Nature of the Cycle Process in Gas-Engines," published in the Transactions of the "Verein zur Beförderung des Gewerbfleisses in Preussen" for 1894 (p. 175), makes the following remark: "The somewhat complicated method, described in Chapter I., of ascertaining the value of lighting gas as a heating medium, by analysis, need not have been used for the purposes of the present work, inasmuch as the industry, ever since 1892, has been in possession of an apparatus—viz., the calorimeter of H. Junkers—which enables the heating power to be ascertained in an extremely simple and reliable manner." This expression of opinion is all the more remarkable as Slaby's investigations have been conducted and controlled with a high degree of scientific accuracy and precision; so that it may be taken for granted that the calorimeter named is sufficiently precise even for scientific experiments, to say nothing of the ordinary requirements of practice.

REGISTER OF PATENTS.

Gas-Generators.—Holt, H. P., of Openshaw, Manchester. No. 15,910; Aug. 23, 1893.

This invention relates to a gas-generator having in its upper part an inclined grate, to which fuel is fed, and through which a mixture of air and steam is blown, in a current directed down through the fuel in the generator. The gas produced is discharged at the bottom, as shown in the illustrations—a half side elevation and half vertical section, a half front elevation and half vertical section, and a half plan and half sectional plan.



A is a cylindrical iron casing, with a refractory lining B, between which and the casing there is a layer C of sand, or other loose material which is a bad conductor of heat. At each side of the casing is a pocket D, with an inclined fire-grate E, surmounted by a feed-shoot F, having a cover and an adjustable slide for regulating the supply of fuel. By means of crank-arms on a rock-shaft, worked by a handle applied externally, the fire-bars (which are hinged) are from time to time rocked, so that ash and clinker can fall into the pocket D, for removal through the door shown. Through an opening G, a mixture of air and steam is injected. It passes up through the fire-grate E and the fuel lying thereon; then down through the body of fuel within the lining B—generating gas; and this finally escapes round the fuel lying on the hearth H, and is conducted to a holder or elsewhere. Doors J are provided for clearing the hearth of clinkers. Each side of the pocket D there is a channel K, by which a portion of the air and steam mixture passes up to a passage, from which it issues through a number of small openings directed obliquely downwards on the fuel. L is a cover which can be removed to give access to a bar for breaking up such clinker as may be formed.

Extraction of Naphthalene and other Hydrocarbons from Coal Tar and Similar Substances.—Clark, F. W., of South Norwood Hill, Surrey. No. 16,769; Sept. 6, 1893.

This invention relates to the treatment of coal tar and similar substances, and has for its object the extraction of hydrocarbons such as naphthalene and benzol.

For this purpose, the patentee proposes to take coal tar, or the product obtained in the process of separating pitch from coal tar, and mix or dilute it with naphtha or other suitable material—such as a light hydrocarbon or spirit. He then passes the mixture through an evaporator, maintained at a sufficiently high temperature to drive off the spirit or other diluent, together with the naphthalene and other hydrocarbons which it is desired to extract. The volatilized hydrocarbons are conveyed from the evaporator by a suitable carrier—such as air or other gas—into a condenser; the pitch or other residue being drawn off from the evaporator into separate vessels from the distillate containing the naphthalene and other desired compounds.

In some instances, the condenser would be heated to such a temperature that only the heavier or less volatile hydrocarbons would be condensed; and provision is made for conveying the lighter or more volatile hydrocarbons (by means of the aforesaid carrier) into another condenser, in which these hydrocarbons are condensed, and from which they are drawn off into suitable vessels or receptacles. The second condenser may, however, be heated to a lower temperature than the first one, so that some of the hydrocarbons conveyed into it will remain uncondensed therein, and will be conveyed by the carrier from the second condenser to a third condenser, and so on. The various compounds extracted from the tar or the like, and also the naphtha or other liquid or diluent previously mixed with it, may thus be separately condensed and collected.

The air as a "carrier" is preferably circulated continuously through the evaporator and condensers, as described in patent No. 4510 of 1893; the condenser, or the last of the series of condensers, being provided with a loaded or spring valve, adjusted to control the flow of the air or other carrier into the evaporator in such a manner as to maintain the desired low pressure or vacuum in the evaporator and the desired higher pressure in the condensers.

The patentee does not give any illustration of the apparatus by which he carries his invention into practice; but he mentions that it comprises an evaporator wherein the liquid to be distilled flows through inclined tubes surrounded by a heating medium, and also a condenser or condensers and means for circulating a "carrier" (such as air) through them, for the purpose of conveying the vapour or spirit from the evaporator to the condensers.

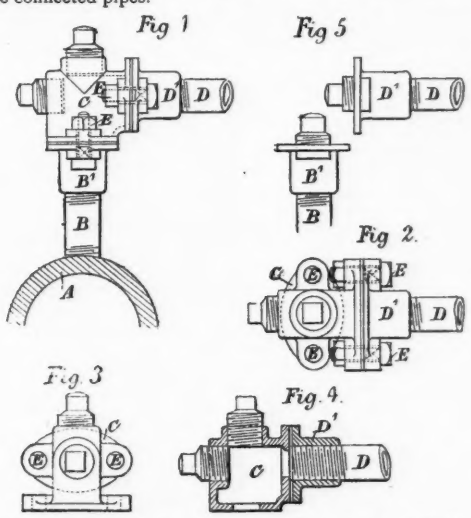
In treating coal tar by his improved method, he finds it advantageous to proceed as follows, by the aid of the apparatus described in his former specification—that is to say, he mixes with the coal tar, naphtha or any other suitable diluent (such as a light hydrocarbon or spirit) in such proportions as to impart the required degree of thinness or fluidity to the tar. He then introduces small streams of the mixture into the tubes of the evaporator at their higher end, and, at the same time, applies to the evaporator sufficient heat to drive off the naphtha or other diluent, together with the naphthalene, benzol, and other compounds it is desired to extract from the tar. The circulation of the "carrier" through the evaporator and condenser is maintained, so that the vapour of the hydrocarbons is conveyed into the condenser by cooling, or by pressure, or by both combined. The liquified hydrocarbons are, from time to time, drawn off from the condenser into suitable vessels; the pitch eliminated from the mixture, or the residue containing the pitch, being (at intervals) drawn off from the evaporator into other receptacles. The distillate thus obtained is useful, says the patentee, "for carburetting air or enriching gas, and for the production of dyes, and for other purposes."

When the naphtha or other diluent, and the various compounds extracted from the tar, are to be broken up and separately collected, the mixture of tar and naphtha or other diluent is passed through an evaporator, to eliminate the pitch; but, instead of the whole of the volatile products being passed into a single condenser as above mentioned, a series of condensers is employed; and sufficient heat is applied to the first condenser of the series to prevent the condensation therein of the lighter or more volatile of the hydrocarbons, while permitting the condensation of the heaviest or least volatile. The vapour from this condenser is then conveyed into another condenser heated to a lower temperature, in which a lighter hydrocarbon is condensed; and so on—the air or other carrier being circulated through the series of condensers, and being forced from the last condenser of the series through a loaded valve into the evaporator. In this way, it is possible to break up or separate and collect the various hydrocarbons extracted from the tar, and also the naphtha or other material previously used for diluting the tar.

In treating the distillate obtained in the process hitherto adopted for eliminating pitch from coal tar, it would only be necessary to proceed in substantially the same manner as that above described with reference to the coal tar, using sufficient naphtha or other diluent to impart the requisite degree of fluidity to the distillate. The heavier or less volatile products remaining in the evaporator would be drawn off therefrom at suitable intervals, while the more volatile products would be conveyed into condensers, and collected either together or separately as desired.

Connections between Gas and Water Service Pipes and Mains.—Woodward, J., of Manchester. No. 19,442; Oct. 16, 1893.

The object of this invention is to construct junctions or connections between gas or water mains and service-pipes, so that they can be readily probed for obstructions by inserting a wire or rod through holes formed in the junctions, and closed by screw plugs, by simply unscrewing the screw plugs; the connections being also formed so as to be readily applied and removed without damage to them or disturbing the connected pipes.



The modification shown by figs. 1, 2, 3, 4, and 5 is suitable for junctions with the top side of the main. A is a part of the main; and B is a vertical pipe, the lower end of which is screwed into the main, and the upper end into a flanged coupling B^1. D is a part of the horizontal service-pipe, the end of which screws into a flange coupling D^1 similar to B^1. Suitable packing material is placed between the flanges before they are screwed together by bolts E (two by preference). In the casting C there are two screw plugs, one opposite the bore of the pipe B, and the other opposite the bore of the pipe D. When the parts are as in fig. 1, the gas or water can pass from the main-pipe to the pipes B and D. By removing the screw plugs, wires or rods can be inserted to remove obstruction; and when removed, the plugs may be replaced without separating the flange connections.

When desired, the intermediate part C can be removed, and the screw plugs inserted in the ends of the couplings B^1 and D^1 (which are screw-tapped for this purpose), as shown in fig. 5. Or, if desired, the

coupling B^1 and pipe B may be made in one piece, and the lower end screwed and tapped into the main.

Instead of removing the casting C, when the supply is to be stopped, the top screw plug may be removed and a long screw plug substituted, inserted through the screw-tapped hole in the part C, the inner end of it screwing into the coupling B^1; and a screw nut may be screwed upon the end of the long screw where it projects above the boss on the casting, for the screw plug. The hole for it in this case is made a little larger, to allow the long screw plug to be inserted tightly in the coupling B^1; the screw nut upon the end of the long screw plug acting to keep dirt from entering the part C.

Fig 6.

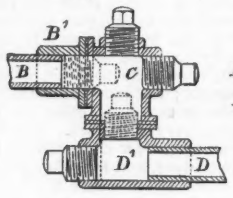


Fig 7

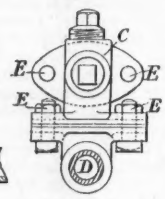


Fig 8

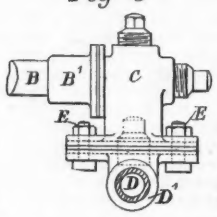
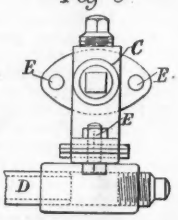


Fig 9



In the modification shown by figs. 6 and 7, B is the pipe supposed to be screwed horizontally into the side of the main (the same as the pipe B, figs. 10 and 11). B^1 is the flanged coupling screwed upon the pipe B; and C is the intermediate part or casting, having two flanges and two screw plugs. D is the service-pipe screwed into a coupling D^1, having a lateral passage and flange and a screw plug. By removing the screw plugs, the pipes B and D can be probed; and by removing the top screw plug, the passage in the part C, and coupling D^1, can be cleared of obstruction.

If the part C is removed, the coupling B^1 is closed by inserting a screw plug in B^1, as fig. 5, and the pipe D, by inserting a screw plug in the part D^1, as shown in dotted line in fig. 6. But if the supply of gas or water is to be cut off without removing the part C, this may be done by inserting a long screw plug in the end of the coupling B^1, as already explained in reference to the modification illustrated by figs. 1 to 5, or by using two screw plugs, one as shown in full and the other in dotted line in fig. 6. The inner screw plug (shown in dotted line) is a little smaller than that for the outer screw, so as to pass through the hole for the latter; and it may be screwed in and out when required, by a suitable box key passed through the hole in the part C, for the outer screw plug.

Figs. 8 and 9 show a similar coupling arrangement to that illustrated by figs. 6 and 7, which is suitable where the pipe B is screwed vertically in the top side of the main, and the service-pipe D passes horizontally.

Another modification will be explained by reference to figs. 6 and 7, and 8 and 9, in which the part C and coupling B^1 (or the part C and coupling D^1) is made to form one casting; thus dispensing with the flange junction between the parts B^1 or D^1 and C. The part C, in this modification has a circular flange with four concentrically slotted holes, for the two bolts which are to unite the flange on the part D^1 (or B^1, as the case may be) with the circular flange on the combined parts B^1 and C (or D^1 and C). With this modification, the pipe D can be coupled with the part for the pipe B with the two pipes in the same line, as shown in figs. 6 and 7, or with the two pipes at right angles to each other, as in figs. 8 and 9; and the concentric slots for the two flange bolts admit of a variation in an angle from either the parallel or right angular position of the pipes B and D in relation to each other.

Fig 10

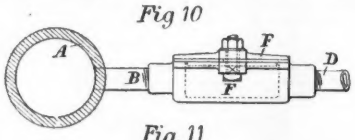
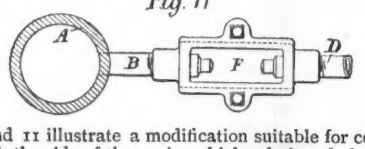


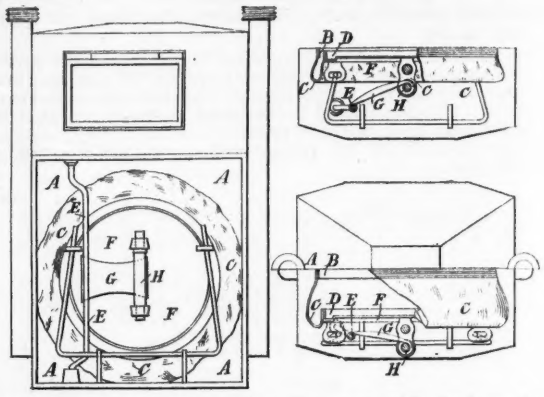
Fig. 11



Figs. 10 and 11 illustrate a modification suitable for connections to be made with the side of the main, which admits of the pipes B and D being probed for obstructions, and also admits of the closing of the ends of either or both pipes, by screw plugs. The pipes B and D in this case are screwed into the ends of a box-casting F, the side of which is open, but can be closed by a lid and bolts.

Dry Gas-Meters.—Schreiner, J. R., of Canonbury, N. No. 2025; Jan. 30, 1894.

By this invention, says the patentee, a 20-light meter need only be the size of (say) a 5 or a 10 light meter; and in consequence "the weight and bulk of material is considerably reduced, as well as the cost of production, without in any way restricting the motion of the moving parts for the regular pulsations of the bellows, or of the index appliances."



The figures are a front elevation of a meter, with the lower front part of the casing removed, and showing one of the bellows, flag, and kinked or bent axle-shaped flag-wire; a part sectional plan, with the flag-wire in position when the bellows is closed; and a similar view, with the flag-wire in position when the bellows is extended.

To each side of the central partition A, separating the two bellows chambers, is secured the larger ring B of a measuring bellows C; the inner edge being secured to the ring by an outer wrapping of cord in the usual manner. D is the outer disc of the bellows, carrying the outer ring; but this ring is less in diameter than the ring of the bellows, and the outer portion of the bellows leather C is turned inward and secured to the outer ring by a wrapping within the bellows, instead of on the inside as usual. By reason of the fact that the outer ring D is less in diameter than the inner ring B, the former can pass within the inner ring when the bellows is compressed; and by reason of the fact that the outer portion of the bellows leather is turned inward before being secured to the ring, this entering of the outer into the inner ring of the bellows is effected without undue wrinkling or distorting of the bellows leather. Moreover, the inward bend of the outer edge of the bellows leather serves to prevent the leather from buckling inward on the compression of the bellows.

By permitting one ring of the bellows to pass within the other, the maximum degree of compression of the bellows is ensured; and in order to permit of the maximum expansion of the bellows, the flag-wire E is located laterally beyond the limits of the outer disc F of the bellows. It will not therefore interfere with the outward movement of the disc; and in order to still further remove the flag-wire from liability to contact with the bellows, the central portion of the wire is bent into a different plane from the pivotal end portions.

The flag-wire is connected by the arm or flag G, and pivot-stem H, to lugs on the outer disc F of the bellows; and this serves to transmit the movement of the disc to the registering mechanism at the top of the meter. As the disc of the bellows moves outward, therefore, the flag-wire turns on its axis, so as to bring its cranked portion to the front, and thus carry it out of the path of the expanding bellows.

Pilot Gas-Cock.—Halliday, J. C., and Fenton, H., of Newcastle-on-Tyne. No. 2173; Feb. 1, 1894.

This invention has for its object the construction of a cock which shall enable two separate streams of gas to issue out of one stopcock, so arranged that, when one supply is turned full on the other may be cut off entirely, in such a manner as to allow the light from one to ignite the gas at the other before either is closed. When several burners are arranged together for lighting or heating purposes, this invention will permit one or a few jets only being used when no more are required. Thus a pilot light or bye-pass can be obtained; and by an additional movement of the lever of the cock, the gas can be turned full on to all the other burners, or completely shut off. These results are obtained by having the cock or valve with its plug or moving part so drilled or grooved that, apart from the usual through-way course, a stream of gas can come out at one or both ends of the plug or out at one or both sides of the barrel of the cock; so that from any of the apertures gas can be conveyed, by an elbow, to any one or more burners.

Liquid Meters.—Thomson, J., of Brooklyn, New York. No. 10,022; May 23, 1894.

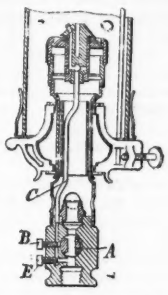
This invention relates to disc water-meters, with the object of improving the operation and simplifying the construction of this type of meter. It is remarked by the patentee that this specification is not burdened with a description of the "disc action" *per se*, as this device in its application to water-meters is well known in the art; but he gives five sheets of drawings, containing eighteen illustrations of details showing an embodiment of his invention in one completed apparatus, and separately the principal details and also several modifications, so as to meet the requirements of the varying conditions met with in practice. The invention is not describable apart from these illustrations.

Incandescent Gas-Burners.—Moeller, J., of Palmer Street, Westminster. No. 10,587; May 31, 1894.

This invention refers to a burner for an incandescent gas-light, provided with a stopcock and with a kindling burner and tube leading thereto, having adjusted communications with the gas-pipe and the cock, so as to maintain a small flame ready for kindling the main flame when required.

In the gas-supply pipe, is a stopcock A, the plug of which, besides having a passage through it, has cut in it a groove extending round a considerable arc of its circumference. A hole, adjustable by a screw B, forms a passage through the shell of the cock to a small tube C,

which extends up through the body of the burner and terminates with a small gas-jet near the centre of the burner cap, and in which cap there is a central hole for the insertion of a wire to carry the mantle. Besides the adjusting screw B, there is another screw D adjusting a



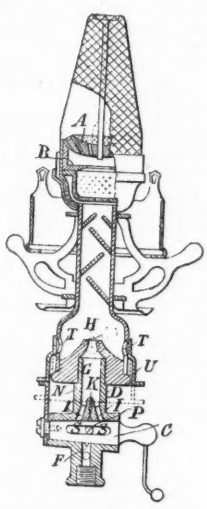
hole forming a passage from the gas-pipe below the stopcock to the tube C. When the plug of A is turned so that there is free passage through it (as shown), the main burner being then lighted, the passage by the hole B to the pipe C and pilot jet is closed; but still a small quantity of gas can pass the screw D, so as to keep the tube C always full. When the plug of A is turned a quarter round, so as to close the passage to the main burner, gas flows round the groove in the circumference of the plug, and through the hole of B to the tube C; the flow being sufficient to maintain the pilot light, ready to kindle the main flame when the plug is turned back to the position for passing gas to the flame. As the tube C is kept always full of gas sent into it by the hole governed by D, though this gas may not be sufficient to maintain a flame at the pilot jet, the turning of the plug of A for extinguishing the main flame allows more gas to pass by the hole governed by B to the pilot burner, where a small flame is ignited before the extinction of the main flame, however sudden that may be.

Gas or Vapour Burners.—House, H. A., of East Cowes, and Symon, R. R., of Abchurch Lane, London. No. 10,702; June 2, 1894.

In patent No. 16,864 of 1893 is described a gas or vapour burner for heating purposes—such as the generation of steam and the like—in which is employed a weighted valve, seated in or over the orifice from which the gas issues, and normally closing it, but adapted to be raised by, and in proportion to, the pressure of gas within the chamber from which it issues, so as to give a constant pressure to the gas, whatever quantity may be passing through the orifice. The present invention relates to improvements in burners of this character, in order to so increase the capacity of a single burner that it may have a much greater range of heating effect, and be available, without waste of fuel or the necessity of adjustment or attention, for producing any desired amount of heat within very wide limits. This is attained by combining in the same burner a plurality of valves of different degrees of sensitiveness, in the sense that they are differently weighted, or restrained against movement by any suitable means (such as by springs), so that the pressure of the escaping gas may be controlled, not only by each valve acting independently, but by the number of valves affected by the pressure of gas acting upon them.

Burners for Incandescent Gas-Lamps.—Thompson, W. P.; a communication from A. Weber and Co., of Nuremburg, Germany. No. 11,302; June 11, 1894.

This invention is for "a safety burner with an automatic lighter for incandescent gas-lights," by means of which the flame to heat the incandescent body is turned down to the lowest possible amount when it is not wanted, but will always maintain the incandescent substance somewhat warm, so that it will not be injured when the supply of gas is turned on suddenly.



The gas-exit tube G has three passages I I, and K, the middle one of which is very narrow, and for the purpose in view is furnished with a regulating screw N. By means of an annular groove formed in the wall of the tap D, the middle exit-passage is always connected with the inlet-pipe F, quite independent of the position of the plug C. Both of the large outlets I are put in connection with, or shut off from, the inlet-passage, by means of the passages P and S. The incandescent burner is in the first instance lit as usual, after the tap C has been opened, whereupon the gas streams through the passages P S I, and then through the tube G and nozzle H. After this, when it has been mixed with air, it passes up through the main burner-tube, and issues out through the head of it to the incandescent mantle. When the tap is shut, a small quantity of gas is constantly passing out through the passage K, and the small flame continuing to burn maintains the incandescent substance constantly warm. If the tap is then opened so that the full flame is obtained, no explosion will result, but "the large flame will be gradually developed out of the small one."

An air-inlet regulator is made use of, so that when the small flame is burning, too much air shall not enter through the openings T of the burner. A slide-ring U, which can be raised and lowered on the Bunsen burner, is employed; and this, on the shutting of the tap, is raised by means of a lifting piece or finger, whereupon the holes are shut. The arrangement of the pipe G between the tap and the burner nozzle is a further important point, as the gas, on issuing from the comparatively small passages I, expands in the tube G; and the speed at which it travels will be diminished, and hissing avoided.

The mixture of gas issuing from the lighting tap and the air-inlet openings T passes through the main tube, in which there are cross partitions, which compel the mixture of gas to change its course of travel and also its rate of speed. This arrangement is devised to prevent any flashing back of the flame, which frequently takes place with Bunsen burners.

In order to always have a mixture of gas and air in some degree equal, a mixing chamber is formed by a sieving basket situated above the main burner tube and at some little distance from the mantle. When the mixture issues out of this chamber, it is again choked or throttled, in consequence of the contraction of the outlet area, by means of a projecting plate or ring B. This will again cause the gas to become intimately mixed, and will moreover aid in the production of a good sized flame, as also assist in the automatic lighting flame, which is in the middle of the burner, being as small as possible. The further formation of the burner-head A is suited for obtaining both the last objects; and, besides this, the automatic lighting flame is shielded against any draughts of the air, so that it cannot become accidentally extinguished.

APPLICATIONS FOR LETTERS PATENT.

14,761.—Cayley, C. T., "Manufacture of oxygen." Aug. 1.
14,885.—Fourness, W. A., "Generating and carburetting water gas." Aug. 3.
14,995.—Dvorkovitz, P., "Obtaining gas and bye-products from liquid hydrocarbons." Aug. 4.
15,016.—Kirby, C., and Liversidge, J. G., "Gas-heated hand iron." Aug. 7.
15,063.—Handel, T., "Gas-bracket lamp-cock." Aug. 7.
15,109.—Schimming, G., "Gas and similar motors." Aug. 7.
15,147.—Goehde, R., "Burners for incandescent gas-lights." Aug. 8.
15,150.—Dawson, B., "Gas-producers." Aug. 8.
15,290.—Boulton, S. B., Hayward, T. B., Boulton, H. E., and Fergusson, H., "Purification or washing of coal tar, naphtha, naphthalene, mineral burning oils, and the like." Aug. 10.
15,316.—Bennett, J. F., and Stacey, F. H., "Gas and oil engines." Aug. 11.

CORRESPONDENCE.

[We are not responsible for the opinions expressed by correspondents.]

Retort-Settings at Manchester.

Sir,—I have read Mr. G. E. Stevenson's letter published in the last number of the Journal, and feel compelled to reply in justice to myself, *re* retort-settings.

I do not make a practice of misinforming any person, and what information I gave Mr. West was perfectly correct. The settings of nine retorts referred to, at one end of No. 1 retort-house, have been let out twice, and relighted for the third time; and they have not worked continuously, as stated by Mr. Stevenson. The settings of eight and nine retorts in a bed have been working continuously, with the exception of a number of the retorts in the settings of nine, which became unworkable, and consequently were bricked up.

With my experience of retort-settings—viz., 34 years—I certainly prefer eight retorts in a bed to nine, as the life of the former settings is much longer.

W. Rodger.

Bradford Road, Manchester, Aug. 17, 1894.

Another Improved Atmospheric Gas-Burner.

Sir,—With reference to the remarks under the above heading, in your last issue, permit me to say that the use of gauze in such a position as to protect it from flame action or mechanical injury, was adopted by myself fourteen years ago, in a series of burners for crucible and muffle furnaces; and these identical burners are still articles of ordinary commerce. In the year 1886, an adaptation of the principle was made for ordinary gas-fire burners; and many thousands were made and sold. They were efficient, silent, and of very great power. After a year's experience, however, they were abandoned, for excellent reasons. Experience proved that the use of gauze, in any position, in any gas-fire burner, is to be unhesitatingly condemned; and no doubt many of your readers will remember the gradual, and in some positions, the very rapid deterioration of these burners. This occurs in all burners in which gauze is used, when these are fixed anywhere near the floor-level; although the defect does not appear in burners used on a table. This accounts for the fact that the laboratory burners made on this principle were, and are still, perfectly successful and satisfactory. The same burners, however, if fixed near the floor-level in a room which is regularly swept and dusted, would rapidly become

useless. No atmospheric burner in which gauze is used is to be depended on for permanent service without attention and repairs; and this defect is very seriously increased when the burners are used near the floor-level, where their action is interfered with by dust caused by carpet sweeping.

Warrington, Aug. 16, 1894. THOS. FLETCHER, F.C.S.

Hirschfeld's Patent.

SIR,—I have read the correspondence in the JOURNAL during the last two weeks on the subject of Hirschfeld's patent, and thought it best not to comment upon it; but as Mr. de Fonblanque's letter in your issue of the 14th inst. consists of a series of statements which I consider to be calculated to mislead your readers, I shall be much obliged if you will insert this letter.

In the first place, Mr. Hirschfeld's patent was never presented to the public at all, either with a "flourish of trumpets" or otherwise. A few gas engineers were invited to a private view only; and, as a matter of courtesy, this invitation was extended to the Incandescent Gas Company. Further, Mr. de Fonblanque states that his Company claimed that Hirschfeld's process was an infringement of their patents; and that neither Mr. Hirschfeld nor anybody else contested that claim. An action is pending in the High Court of Justice, and is being defended by the Deimel Light Company, Limited. That Company are not, and never were, the owners of Hirschfeld's patent, but are the sole licensees of Mr. Hirschfeld for a secret process for the manufacture of incandescent lights. The only point of litigation between the respective Companies is whether or not this secret process is an infringement of Dr. Auer von Welsbach's patents. The Deimel Light Company contend not only that the two processes are distinct, but, in the action now pending, the validity of the letters patent of Dr. Auer von Welsbach will be contested.

W. M. HODGES,
Aug. 16, 1894. General-Manager, Deimel Light Company, Ltd.

The Meter System v. Inspection for Detecting Waste of Water.

SIR,—Your correspondent "Waste Inspector," writing in your issue of May 29 upon the above subject, appears to acknowledge the wastefulness of the automatic flushing-tank; but he also asks: "Is it not the most efficient sanitary appliance?" My answer is: "No; because its action cannot be relied upon." I have frequently found many of these appliances discharging at the same rate as the water entered, and have found it to be the practice to increase the rate of inflow in order to make the syphon discharge; thus considerably increasing the waste. A proper and efficient syphon waste-preventer, worked by a pull, will give quite as good a flush as an automatic tank; and it is far more certain in its action. "Waste Inspector" further states that no such appliances would be allowed to be fixed outside London without a meter having a minimum rate. Am I to understand from this that he is an advocate for placing a meter at every house where these monstrosities are fixed, or are likely to be fixed, to command the whole domestic supply? If this is his intention, it would be well for him to know that such an arrangement would entirely alter the whole system of water supply as laid down by the Legislature, and require an alteration in existing Acts of Parliament. He must also not lose sight of the fact that passing the water through a meter does not prevent wasteful use, but simply alters the method of charge.

Quoting from Mr. Collins's paper* your correspondent says: "Hydraulic motors, lifts, and elevators, when worked off comparatively low-pressure mains, occasion undue consumption of water;" and he recommends as a remedy the use of a meter for such supplies—losing sight of the true meaning of the author's statement, which was to the effect that lifts, &c., to be worked economically should be worked by high pressure. In London, all public fountains are supplied by meter. But the toy fountains or fish aquariums fixed upon the consumers' private dwellings cannot be supplied by meter without entailing enormous cost; and, even when paid for, they are a source of useless waste.

In reference to the hose-pipe and garden sprinkler left running all night, "Waste Inspector" states that the wilful waste will be reported by the night inspector; and, there being a fine for wilfully wasting water, he suggests that it should be enforced a few times. Let "Waste Inspector" come and try his hand at a case or two in any London Police Court; and he will soon find himself outside the Court with expenses to pay.

I would remind "Waste Inspector" that testing and stamping water-fittings has been carried on for a long period by other towns besides Manchester. "Waste Inspector" says again that, "the waste at Liverpool grew so enormous (as is the case at present in London)." He has, however, rather magnified this great waste of water in London; the following being the average number of gallons per head per day for the nine years ending 1892, as worked out from the Official Water Examiner's returns: New River Company, 20·6; Lambeth, 22·3; Kent, 22·9; West Middlesex, 24·8; East London, 25·5; Southwark and Vauxhall, 26·4; Chelsea, 28·8; Grand Junction, 31·2. These figures are for domestic supply only. They include, however, a very large number of unmetered trade supplies; and if 10 per cent. is deducted for these supplies, which, I am sure, is under-estimated, it makes the consumption in the case of the New River Company 18·56 gallons per head for domestic purposes. Taking the habits of London, the Grand Junction and Chelsea Companies cannot be called high; the East London, West Middlesex, and Southwark and Vauxhall are medium; while the Kent, Lambeth, and New River cannot be called very wasteful. So much for the enormous waste in London.

"Waste Inspector" states that the author says "that a waste-water meter would enable an inspector to see at a glance the precise locality in any district where waste was taking place;" and he goes on to state that he has had some experience with the system, but cannot see how the waste is ascertained or traced. If he will simply read carefully the paper he has endeavoured to criticize, he will find all the information required to enlighten him on these matters. Evidently the experience he claims to have had must be very limited. It is a well-known fact that the waste-water meter enables an inspector to see at a glance in which district excessive waste is taking place, out of (say) 200 districts; and to further localize this waste on the wasteful district or street or individual house, is a mere matter of detail to those who understand the waste-water meter system. With the system of listening on the service sluice-valves and outside stop-valves for waste, without the aid of the meter, the waste inspectors have nothing to guide them as to which district to go to in order to look for the waste. Now, give a clever waste inspector fifty streets to operate upon, and ask him which are the most wasteful streets. He simply does not know, but must go through the whole fifty. The three last streets he goes through may be the very worst, and therefore much loss of time is incurred.

I have known many cases where the waste-water meter has registered serious waste upon a certain service, yet, after careful manipulation and stethoscoping of this service sluice-valve by the night inspectors, they have failed to hear the water passing through the valve. With the system of stethoscoping the service-valve, with a view of detecting the waste, such cases as those before mentioned would be missed, and the service would be credited with having no waste, yet from 400 to 500 gallons per hour waste would be taking place; and even when a district has been inspected under this system, and credited with having all the waste stopped, they are unable to say whether they have saved any waste, or whether the waste is greater in consequence of these invisible defects still remaining, or further ones having broken out. I have found that, under the system of house-to-house inspection over a complete district, the inspector has reported all the waste to be stopped; but when tried by a waste-water meter without his knowledge, I have found it to be as bad as ever, and no actual saving effected. Therefore the waste-water meter system not only points out the district where the waste is taking place, but records the amount, and shows the saving. It is also a check on this district until it requires inspection again—thus saving a useless number of inspections.

A comparison of the efficiency of the waste-water meter system, *versus* the detection of waste by stethoscoping sluice-valves, stop-valves, &c., can be obtained from three of the London Companies: New River, 20·6 gallons per head per day, less metered trade only; Lambeth, 22·3 gallons do.; Grand Junction, 31·2 gallons do. The two former Companies use the waste-water meter system; the latter does not. The figures are for domestic supply only; trade supplies by meter being deducted. "Waste Inspector" asks why it is that Manchester can check waste, and keep up a constant supply at 20 gallons per head per day. The facts are obvious. How many baths are there in proportion to London? Not one in 100, or, I will more correctly say, one in 200. How many water-closets are there also in Manchester in proportion to London? Not one in 100. Then how can Manchester be compared with London?

"Waste Inspector" says: "How is it that about 400 towns giving a constant supply are showing better results than London?" I say it is on account of the very few water-closets and baths in proportion to the population; and I very much doubt whether "Waste Inspector" can give a list of 100 towns, or anything approaching this figure, having water-closets and baths in the same proportion as London, maintaining a constant supply throughout the year, without resorting to the intermittent system, similar to Manchester and other towns, in the summer months, at an average daily supply, extending over nine years, of 20·6 gallons per capita for domestic and unmetered trade supplies, and with 25 per cent. deducted for trade purposes only. Besides most of the towns to which "Waste Inspector" evidently refers have gravitation supplies, and the water is gauged—always an uncertain system. In most of the towns where the domestic supply is down to 10 and 12 gallons per head per day the supply is gauged; and there certainly appears to be a doubt as to the correctness of the gauger's figures.

London can be fairly compared with Glasgow and Edinburgh, where the supply is at the rate of 40 and 35 gallons per head per day respectively for domestic purposes, including unmetered trade supplies. This comparatively large consumption is doubtless caused by baths and water-closets. In London, it is now the practice to fix baths, say two closets, and circulating hot-water apparatus in houses of £25 a year rental; and this fact is sufficient contradiction to the assumption that the consumption can be reduced to 10 or 12 gallons per head per day in London. There is plenty of room for improvement, but not to the extent mentioned.

"Waste Inspector" states that waste-water meters require to be worked daily. This is absurd. It is only necessary to work a waste-water meter once every fortnight; and this is definitely stated in Mr. Collins's paper to be the practice in the New River Company's district. This keeps the staff apprised and on the alert; and, as already pointed out, it shows which district is wasteful and which is not—saving time, and obviating unnecessary inspections.

As "Waste Inspector" says he knows of a cheap and efficient plan, it would only be fair for him to expound it by giving the cost of providing and fixing outside stopcocks on other people's pipes, the cost of excavation, fixing guard-boxes, repaving, &c.; also the cost of maintaining the town in efficient order, and the annual expense of keeping the consumption at (say) the 12 or 15 gallons per head per day for all purposes which he considers sufficient. It must be clearly understood to be wholly a water-closet town (one to every house and cottage) with a proper proportion of baths. If this is done, I have no doubt some of your readers will furnish figures to astonish him.

July 26, 1894. LONDON.

* See JOURNAL for March 20 last (p. 536).

St. Ives Gas-Works.—These works were offered for sale by public auction last Tuesday. They were seized under an execution for rent, coal, and money due at the bank; and the whole of the plant was purchased, on behalf of the Corporation, for £235.

The Helio Incandescent Gas-Burner Company, Limited, has been registered with a capital of £5000, in £1 shares, to acquire, develop, and turn to account the right to manufacture and sell the Helio incandescent gas-burner in the United Kingdom and the Colonies, as well as in France and America.

MISCELLANEOUS NEWS.

SOUTH METROPOLITAN GAS COMPANY.

The Ordinary Half-Yearly General Meeting of this Company was held at the Bridge House Hotel, London Bridge, on Wednesday last—Mr. GEORGE LIVESEY in the chair.

The SECRETARY (Mr. Frank Bush) read the notice calling the meeting, and also the minutes of the last meeting; and the report of the Directors, with the accounts for the half year ending June 30 last—given in the JOURNAL for the 7th inst.—was taken as read.

The CHAIRMAN, in moving the adoption of the report and accounts, observed that it would become his duty, after making a few comments on the report, to refer to the interview which a deputation had on the 9th inst. with the President of the Board of Trade. The first paragraph of the Directors' report dealt with the question of the reduction of price. He might say that some doubt was felt by all of the Directors whether they would be able to lower the charge when they did. They saw their way to do so as regarded the June half year, but not as regarded the December half, because of the increased cost of coal and the uncertainty respecting products. Following their usual practice, however—and it was this that turned the scale—they said they would give the consumers the benefit of the doubt; and they had found in this case, as they had in others, that the bold course had been the right one. The reduction had been justified by the results of the half-year's working; and their fears had not been realized with reference to the products, the prices of which still kept up to a very fair figure. The second paragraph of the report alluded to the favourable result of the half-year's working being due to the low price of coal and the good return for their products. But the most satisfactory part of the paragraph was the statement relative to the increase of business, which had been at the rate of 5¾ per cent. over the June half of the previous year. The greater part of this took place in the second three months; for in the first three, it was only 1·6 per cent. They could not but regard as very satisfactory the half-year's increase in their business. While on this question, he might refer to the past month. As was observed a fortnight ago, July might be taken as a somewhat normal month with reference to temperature, sunshine, &c.; and in that month they had an increase of just over 10 per cent. in excess of July, 1893, and of 15 per cent. in excess of July, 1892. The increase of 10 per cent. last month was, therefore, not on a decrease in the corresponding month of last year, but really an increase on an increase. This, he thought, was very good evidence of the vitality of the Company's business. He might go a little farther back, perhaps, and state that, taking the June half of 1889, and comparing it with the corresponding half of 1894, the increase had been 21¾ per cent. in the five years. This had resulted in a sale of gas in the past half year of something like 620 million cubic feet in excess; and this 620 millions had brought them a profit of about £31,000, or, speaking roughly, £50 per million. This £31,000 was the increase in their profit in the June half of 1894 compared with the same period of 1889, in consequence of their augmented business. With respect to what had become of this additional profit, £10,574 of it had gone in the payment of dividends on additional capital; leaving £21,000 which had gone to the consumers in the shape of reductions in price. While, therefore, the Company had gained the increased amount of interest he had mentioned on additional capital (which was practically no gain for the shareholders, for they had received no larger dividend—that going to the reserve fund), the consumer had gained a reduction of about 1½d. per 1000 cubic feet. There was another way of looking at the matter which he would lay before them. The June half of 1889 might be taken as a normal half year as to expenses; but the four succeeding years were very hard times for gas companies. There had, in fact, been no times so hard for them in his opinion as in the last four or five years, owing to the difficulties by which they had been surrounded. If they had been able in the four years succeeding the June half of 1889, to make gas at the same price as they did in that half year, they would have saved £422,000. In consequence of the increased cost of coal, labour, and other things in the four years from June, 1889, to June, 1893 (he left out last year, because they had then come nearly to normal times), they had laid out £422,000 more in the manufacture of gas than they would have expended had the same prices prevailed as in June, 1889. This was the net extra cost after deducting receipts from residuals. The £422,000 had been met in this way. They had raised the price of gas by 3d. per 1000 cubic feet (of which in the past year they had taken off 2d.), which had brought in £138,000; and the remaining £284,000 had been met partly by a reduction in the dividend, and partly by using up their reserves. They had, in fact, used more than £200,000 of the reserves in meeting the increased cost of manufacture he had mentioned. To put the matter roundly, of the loss sustained in these four years owing to the increased cost of coal and other things, the consumers had contributed one-third—or hardly that—and the Company had made up the rest of the deficiency. He did not think this an unfair arrangement. In the third paragraph of the report, the Directors referred to the "penny-in-the-slot" meters, the rapid demand for which had astonished them all. At the present time they had about 20,000 of these customers; and they were putting in more than 300 meters a week. This entailed a good deal of trouble on their staff; and some people would ask what advantage the Company got out of these small consumers. In the first place, the Company said that, if they could meet the demands of the working classes for gas on such terms as would pay them without making any surplus profit at all, it was their duty to do so. This was the feeling of the Directors. They had been granted the monopoly of the supply of gas in a large district in South London; and if people wanted gas, they ought to have it, if the Company could supply it without loss to themselves. It had not, however, been a loss. The 20,000 consumers he had mentioned burnt, on an average, about 12,000 cubic feet of gas a year, or 240 millions. On a million cubic feet of gas, they had about £50 profit; so that on 240 millions they would get a profit of £12,000 out of the "penny-in-the-slot" meters. What became of this sum of £12,000? He might state that, in order to supply these 20,000 consumers, they would, under ordinary circumstances, have to expend probably £100,000 of new capital on building works, laying mains, and providing meters. The mains, however, were laid, for they had put them down in hundreds of streets for the supply of gas to the public lamps; and they were now ready to supply private customers. They might assume £100,000 as an outside figure to meet this extra business; and the charge on this would be about 5 per cent. or under—say, £5000. This left £7000 of surplus profit on these 20,000 consumers. This sum, however, did not go to the shareholders—at least, only very indirectly, and to a very small extent. The £7000 went towards a further reduction in price. The consumer would thus get five-sixths of the amount, and the shareholders would then be entitled to about one-sixth in the shape of increased dividend. The whole thing was, therefore, working to the benefit of the Company, though only to a small extent, and to a much greater extent to the benefit of the consumer. While on this particular point, he might briefly refer to the last lines of the second paragraph of the report, where the Directors made allusion to "the praiseworthy devotion of all the principal officers to the Company's interests, seconded, as it is, by the cheerful spirit in which the subordinate officers and workmen, with few exceptions, do their duty." He felt bound to say that no Company could be served by a more devoted staff than this Company. They had carried out the wishes of the Directors in the most earnest and intelligent manner; and it was to their devoted interest in the prosperity of the concern that they were largely indebted for the position it held that day. When he spoke of the officers, he included the officers of all ranks—the Chief Engineer, the Secretary, the Engineers at the stations, the clerks, and the foremen. He was bound to say that the workmen also were labouring in a good spirit—in such a good spirit that, although the Company gave them a large amount of bonus, the whole of it, he was satisfied, was earned by the men. The next paragraph of the report referred to the increase of capital. He was very glad to state that their capital account was not closed, and was not likely to be. They would be very sorry if there were any prospect of the capital account being closed, because this would mean a close or end to the increase of their business, upon which they most relied for additional prosperity. He was indebted to the JOURNAL OF GAS LIGHTING for a hint that he should say a word respecting the reason of increasing the amount of the bonus paid to their workpeople or employees—that was, to the whole of the staff. They had been giving them a bonus of 1 per cent. on their salaries and wages for every penny reduction in the price of gas; but this had now been increased to 1½ per cent. It had been remarked that those who were unfriendly to the movement would say to them: "Yes; you are obliged to increase the bribe." This was not the case; there had been no suggestion or hint from any quarter whatever that the Directors should increase the amount of the bonus. It was reduced from 5 to 3 per cent. when the price of the gas went up; and their staff accepted this, as they should have done, in a right spirit—feeling that it was due to the increase in the price. They then "put their shoulders to the wheel" to get the price down again. The fact was the Directors found that the advantages of the system were such that they were justified in increasing the bonus; but they coupled it with the condition that all their employees should leave half of the amount in the Company's hands, to be invested in the Company's stock. They therefore not only had an interest in reducing the price of gas, and thus getting a larger bonus, but they had the still further interest of being shareholders in the undertaking. Some years ago he remembered, in connection with a strike on the Taff Vale Railway, that there was an engine-driver who would not strike. He said: "How can I strike against myself? I am a shareholder in the railway." Although they had not the least fear of any strike, yet the fact that their workpeople were shareholders in the concern was a move in the right direction; and they now numbered about 360. He might add that not only their workpeople, but also their customers, were invited to become shareholders. A few days ago, Sir John Hutton, the Chairman of the London County Council, in the course of his annual address, said it would be a very great thing if public bodies would so issue their stock that the small investor could put his savings into it—that was to say, instead of issuing stock in lots of £100, to issue it in lots of £5. Well, Sir John Hutton might take a leaf out of the Company's book. They had been doing for some years what that gentleman had suggested. During the last three or four years, they had offered their stock to their consumers in lots of £5 and upwards, with the result that it had been taken up very largely. He might state that nearly half of the shareholders were now holders of their "C" stock—not half in amount, but half in number. They had about 5000 shareholders, of whom 2400 were holders of "C" stock, the whole of which had been issued at a high premium, subject to the auction clauses.

A SHAREHOLDER: We should like some more. (Laughter.)

The CHAIRMAN said the Directors would let them have more when they could do so; but they could not increase their capital simply to give the consumers an opportunity of investing in it. All the stock issued the last three or four years had been offered to, and taken by, their customers and workpeople. In another paragraph of the report, there was a reference to the question of the conversion of their stock. He was not in a position to say anything about this matter at present; but their experience had shown them that it was a very great disadvantage that stock bearing a dividend nominally of 13 per cent. should pay an investor less than 5 per cent. Such stock ought to be issued at par to pay about 5 per cent., and not at such a high premium as was now demanded. If it were found to be possible at any time to convert their stocks, the idea would be that they should all be converted into a uniform 5 per cent. stock. That was to say, that all classes of shareholders—"A," "B," and "C"—should receive the same income as now on a uniform 5 per cent. stock, instead of on a stock with the inflated nominal dividend mentioned. In the last paragraph, there was also a remark requiring a word of explanation. The report said: "The price of gas entitles the shareholders to a dividend of 13½ per cent.; but bearing in mind that the reserve fund has been so seriously diminished within the last five years, the Directors consider it necessary

that it should be materially strengthened. They do not recommend any increase of dividend, but that the same rate as before be paid." Five years ago the Company had a reserve of £250,000, which was reduced two years since to £36,000. This was far too small to be safe, or to be to the advantage of either the consumers or the shareholders. Nothing, however, could be added to the reserve fund out of excess of profits; and therefore, if they wished to increase this fund, they must add to it from the divisible profits. They had been paying a dividend nominally of 13 per cent. for a good many years; and instead of increasing it now, the Directors thought it would be advisable to add to the reserve fund the odd ½ per cent. to which the shareholders were entitled. The Board, however, had no authority to do this absolutely, and to tell the shareholders that they should only receive 13 per cent. when they were entitled by Act of Parliament to 13½ was not in their power. The matter rested with the shareholders; but the Directors most strongly recommended that the odd ½ per cent. should for some time to come be added to the reserve fund, so as to place it in a more solid position. (Cheers.) He was very glad to receive this mark of their approval. His concluding observations would have reference to the deputation last week to the Board of Trade, where certain speeches were made upon which he desired to say a few words. Mr. Rowlands, in his speech, referred to the 10 per cent. dividend upon the sliding-scale, and said the Chartered Company had 3s. 9d. as their initial price, while the South Metropolitan Company's standard was 3s. 6d. He then said that "he thought this was a rate of interest which was out of all keeping with modern ideas of investment, and one which he had a very strong notion should be altered." Mr. Rowlands did not know so much about this matter as the Gas Companies did. In 1876, the rate of interest for all new capital was altered by a Standing Order of Parliament from 10 to 5 per cent. in the case of all gas companies. Of course, Parliament did not reduce the rate on the original capital, which was issued years ago, and in connection with which many of the earlier holders lost money; but it did make provision, at the instance of Sir Thomas (now Lord) Farrer, that future capital should be raised at the market rate by auction or public tender. Sir Thomas Farrer had the auction clauses introduced as a Standing Order of Parliament; and the result had been that the rate of interest on gas stocks, had been altered since 1876 from 10 to 5 per cent. Mr. Rowlands also alluded to a little matter that occurred a fortnight ago, when the South Metropolitan Company were invited to join hands against "the common enemy." On this point, he would have a little to say presently; but in the *Citizen* account of the meeting in question, it was said: "The two however"—meaning Colonel Makins and himself—"determined afterwards to join hands against what the Colonel called 'the common enemy.'" But there was no "joining hands" at all. He was invited to join hands to fight "the common enemy;" but he made no response whatever to the invitation, as gentlemen now present knew very well. Another speaker at the deputation (Mr. Howes) said that Parliament ought to fix a limit "far lower than 10 per cent. He himself doubted very much whether it should be above 5 per cent." As he (the Chairman) had said, 5 per cent. was now the limit fixed by Parliament, and practically under that. The Rev. E. Canney (he thought such gentlemen ought to keep out of business matters) observed: "It had been well said"—the speaker thus giving his approval to the sentiment—"that what Parliament had given, Parliament could take away." He (the Chairman) would have a little more to say about this when he came to Mr. Bryce's reply. Mr. George Howell, M.P., made the best suggestion of all; and he must admit that it was a very fair and reasonable one. The honourable gentleman said "he hoped that something would be done in connection with the Board of Trade which might lead to a solution of this difficulty by the Companies meeting the consumers in a fair and honourable manner." This was the right spirit in which to deal with the matter—by the Companies meeting the consumers in a fair and honourable manner. He now came to Mr. Bryce's reply. A good many persons had referred lately to the advisability or probability of the London County Council becoming the owners of the gas-works in London; and the President of the Board of Trade was quite right when he said that this was "a very large question." It was so in the matter of money, for probably the London County Council would have to raise £50,000,000 in order to buy up the three Companies' undertakings; and he thought this was a pill which that body would not swallow readily. If, too, they did so, it was very doubtful whether they would manage the business so well as the Companies did. One great advantage which the consumers in London had had in the last thirty years had been, if not actual competition between Companies supplying the same district, the competition of comparison. They had been able to compare the price charged by one Company with the price charged by another; and he was sure that this had helped them very materially to get the price down. If the whole of the gas supply of London were in the hands of one body or one company, there would be no competition of comparison, and no one would be able to say that this or that should be the price. London could not be compared with Birmingham or any other place, because the circumstances were different. If the County Council had the gas supply, there would be no competition of comparison; and, whatever might be the result, he was quite certain that the consumers would be worse off. What did the County Council or these people want? The Metropolitan Board of Works came to a wise conclusion some years ago. They said: "The orange is sucked dry; the price of gas in London is so low that there is nothing to get out of it." Municipalities wanted the gas supply in order to make a profit out of the consumers in aid of the rates. This was so in England, although in Scotland, he believed, they sold gas at cost price. In England, however, the municipalities made a profit out of the gas consumer for the benefit of the ratepayer. What would this result in as regarded London? It would make the small tradesman as well as the working classes pay more for their gas than was necessary, in order that those who employed the electric light, or who did not use gas at all, might have lower rates. It would be a most unjust thing for the consumer, and would work to his detriment. He did not believe either that, if the gas supply of London were in the hands of the Municipality, there would be any enterprise—any effort to meet the wishes of the consumers, as in the case of the Companies. For instance, with regard to "penny-in-the-slot" meters, why should the officials of a corporation give themselves no end of trouble to obtain an increase of business, when there would be no advantage to themselves or anyone else from such an increase? The proprietors would remember that a little while ago a decision was given in the House of Lords as to the purchase of the tramways; and it was laid down that the price was to be based on the Act of Parliament which prescribed that there should be no consideration for past or future profits. This meant, in the case of the Gas Companies, that there should be some consideration for past and future profits. Mr. Bryce evidently also regarded the matter in this light; for he remarked: "One speaker had said that what Parliament had given, Parliament might take away; and several had referred to the gentlemen who had invested years ago, and who were now receiving large dividends upon the prices which they had paid for their shares—it might be eighteen or twenty years ago. [It was a good deal longer ago than that.] They could not, however, look upon the matter purely from the point of view of the gentlemen who bought when the shares were low, because the purchases of shares had been going on constantly; and, although the dividend might be nominally paid at the rate of 12 per cent. [he was glad Mr. Bryce used the word "nominally"], that dividend would be a very much smaller one to the recent investors, who had bought shares at the high prices. He did not think any of them wished that the question of the position of investors, and the question of the general faith of an investment upon a parliamentary security, should be excluded from consideration. Evidently it was an extremely important part of the question; and although a bad bargain might have been made, still a bargain which was made by statute was a bargain which *primâ facie* was entitled to be respected, and which Parliament could only be asked to reconsider upon very strong evidence indeed, and upon conditions which would prevent any disturbance of the faith which was placed, and rightly placed, upon a parliamentary bargain." Mr. Bryce repeated: "This was a question of very great magnitude," and so on. He (the Chairman) thought this was very much in favour of the Gas Companies. The President of the Board of Trade said farther on, towards the close of his speech: "He was bound to have regard, on the one hand, to the good faith which they must keep with investors, and to the danger of disturbing a settlement by Parliament, on the faith of which investments had been made; and, on the other hand, to the general interests of the people of London." With this, he (the Chairman) quite agreed. The "general interests of the people of London," of the gas consumers of London, were quite as dear to the Company as they were to any Government or local authority whatever; and so far from fighting "the common enemy," they knew of no "common enemy." They would only fight if people attacked them. They would only fight in self-defence, and in defence of their rights. If anyone attempted to rob them of their freedom, or property, they would fight. That was the only "common enemy" they knew. The consumer was not their enemy, but their friend and partner; and he (the Chairman) thought he might refer to the action of the Company for a number of years to show they had loyally, fairly, and honourably carried out the compact to have the consumer as their partner. If Mr. Rowlands or anyone else would show them how they could reduce the price, so far from regarding him as an enemy they would accept him as a friend; and if anyone could show them how they could reduce the price further, nothing would please them better. He was quite sure Colonel Makins had not meant to convey that the gas consumer was an enemy; and unfair use had been made of this rather smart expression of the Governor of the Chartered Company. He might add that, at the meeting of that Company, they were challenged to take off the meter-rent. It was said that, if they would do this, the Chartered Company would do likewise. He had only to remark on this point that the consumer must pay for the meter in one way or another. Some persons might say that the consumer did not pay the coal merchant for sending scales on his waggon; but the consumer nevertheless did pay for the scale in the price of the coal. But gas supply stood by itself, for every consumer must have a meter for his own special use, for which he must pay in one way or the other, as he would have to do if a separate pair of scales had to be provided for every customer. Parliament, too, had settled that meter-rent was a perfectly right and proper charge to make. It might be objectionable, as all charges were; but an additional penny on the price of gas would be still more objectionable. If they took off the meter-rent, they would have to charge 1d. per 1000 cubic feet more for gas. There was not a single reduction of price they had made in the last seven or eight years which they would have been able to make at the time they did if they had not charged meter-rent, because this £10,000 in the half year had been what had turned the scale in the mind of the Board. He considered it a fair charge; and if it were objectionable, it was less so than a penny on the price of the gas would be. He repeated—and he wanted it to go forth—that they regarded the consumer as their friend and partner; and they would do everything in their power to serve his interests.

Mr. SIMPSON ROSTRON, in seconding the motion, said that, in view of their being threatened with new gas agitation, and remembering that people's memories were short, he should like to remind the public that, when the sliding-scale was adopted, the Gas Companies surrendered very valuable rights. They gave up, for instance, the right of letting their shareholders have at par all new stock that was issued. It was in consequence of their being able to reduce the price of gas, that they were in a position to pay a larger dividend than 10 per cent.

Mr. BESLEY said he regarded the Company as unique; and he referred to the commendations which had been bestowed upon the Chairman during the past few years. The decision of the House of Lords in regard to the purchase of tramways was based on the wording of an Act of Parliament passed in 1871; and, so far as he was aware, these words did not occur with reference to the London Gas Companies. Probably if the words had been interpreted clearly and forcibly before the Bill became an Act, there would have been no contribution in the way of capital for making tramways in London. It seemed the grossest fallacy to suppose that a public authority might use the capital of a company for some years, and then sponge it out. With regard to what was stated in the report respecting the conversion of their stocks, he thought, if it could be done it would get rid of a great disadvantage. Their "B" stock was quoted at 275, on account of the large dividend nominally distributed to the holders of

the stock; but probably nine-tenths of the proprietors had paid a premium—some more and some less—for this stock, which he mentioned because it was the largest stock in the Company. It seemed to him that, if they could make this stock 250 at 4 per cent., it would be better than making it 200 at 5 per cent., because, bearing in mind the value of money at the present time, they must really shortly contemplate investors looking to gas ordinary stock as being, at all events, as safe as railway ordinary stock. When they found railway ordinary stock easily sold and placed at £2 18 per cent., or £3 per cent. at the outside, it seemed to him that for any person who wanted to invest his money safely, and get his interest, a 4 per cent. gas stock would command a premium. The Crystal Palace District Gas Company had gone rather beyond the expectations of their Board in the premium annexed to the stock since the passing of the Act of Parliament with regard to this matter.

A SHAREHOLDER thought they must all thank Mr. Livesey for the splendid way in which he had managed the Company. Their Chairman had shown, not only in recent discussions, but on all occasions, a happy combination of the *suaviter in modo* and the *fortiter in re*.

Another SHAREHOLDER inquired if there was any objection to printing in the report the amount of dividend payable on the various classes of stock. He held some "B" stock. It went forth in the newspapers that, according to the report, they were going to pay a dividend of 13 per cent.; and the public, who naturally knew nothing about the position, supposed they paid 13 per cent. all round.

The CHAIRMAN, in reply, expressed his obligations to Mr. Besley for his suggestion regarding the conversion of the stock. Mr. Besley's remarks should have the full consideration of the Directors if and when the time came to take this matter in hand. If they were selling a 5 per cent. instead of a 13 per cent. stock, they would get a higher relative price for it—in fact, they would get their new capital at a somewhat lower figure than they did now. This would be to the advantage of the consumer; but the original shareholder, as an investor, would not be affected—his income remaining the same. It would, moreover, do away with the obloquy of what were called "bloated dividends." With reference to mentioning in their report the dividends paid on their various stocks, he thought the course they followed was the best. It was far better to speak of the dividend as 13 per cent., which was really the nominal dividend paid on the whole of the stock; the variation between the distributions made on the "A" and the "B" stocks being simply the result of an internal arrangement between these stocks. If they were to state that the "A" stock received 15½ per cent., the "B" stock 12 per cent., and the "C" stock 13 per cent., their opponents in the Press would pick out the 15½ per cent., and state that this was their rate of dividend.

The motion was then put and carried unanimously.

On the motion of the DEPUTY-CHAIRMAN (Captain T. B. Heathorn), seconded by Mr. E. H. CARDWELL, the dividend recommended was afterwards declared.

In acknowledging a cordial vote of thanks, proposed by Mr. BESLEY, and seconded by Mr. MEWS,

The CHAIRMAN assured the shareholders that the Directors heartily appreciated these acknowledgments of their services. Their one object was to act fairly towards the three classes for whom they were trustees—their shareholders, their employees, and their customers. He afterwards referred in eulogistic terms to the services of the staff, and concluded by proposing a vote of thanks to them and to the workmen.

Mr. R. MORTON seconded the motion.

The CHIEF ENGINEER (Mr. Frank Livesey), in acknowledging the vote, assured the proprietors that the entire staff and workmen had the prosperity of the Company at heart. They all had one aim before them—that was to reduce the price of the gas, by which they would obtain an increase in their bonus. With respect to the subject of smoke abatement in London, the Gas Companies did not always receive the credit to which they were entitled. They had 30,000 cookers and 8000 or 10,000 gas-fires; and they were also selling within the London district about 200,000 tons of coke a year. All this must cause a very considerable reduction of the smoke which would otherwise be caused.

The SECRETARY also returned thanks, and the proceedings then terminated.

CRYSTAL PALACE DISTRICT GAS COMPANY.

The Half-Yearly Report and Accounts.

The report of the Directors of this Company, with the accounts for the half year ending June 30 last, has been issued; and it will be presented to the proprietors at their half-yearly meeting on Friday next. It is stated in the report, which is signed by the Chairman (Mr. G. Livesey), that the moderate price of coal under last year's contract—this year unfortunately increased—the good returns from coke and ammonia, and an increase in business of 2·36 per cent. on the gas sold, have resulted in a profit on the half year of £18,315, which, after paying a dividend of 5 per cent., and adding £334 to the reserve fund, will leave £1948 to be added to the balance to be carried forward to the next accounts. Under the Act obtained last year, the sliding-scale of price and dividend has now come into operation. On the Company's 5 per cent. ordinary stock, the shareholders are entitled to an additional dividend of one-eighth (or 2s. 6d.) per cent. for every penny at which gas is sold below 2s. 10d. per 1000 cubic feet. The price to June last was 2s. 9d.; consequently a dividend at the rate of £5 2s. 6d. per cent. per annum might be paid. It must, however, be clearly understood that, beyond accretions of interest, nothing can now be added to the reserve fund, except a portion of the divisible profits. The Directors therefore recommend that, whenever the price of gas is at an odd penny, the odd 2s. 6d. per cent. shall be added to the reserve fund. Satisfaction is expressed that from the commencement of the present half year a reduction of 1d. has been made in the price of gas; thus bringing it down to 2s. 8d. per 1000 cubic feet. Seeing the success that has in other places attended the introduction of "penny-in-the-slot" meters, for supplying weekly tenants with gas, the system has been adopted in the Company's district. About 1100 of these meters have already been fixed; and additional orders are constantly coming in. The steady increase in business necessitates additional works, mains, and meters; and for this purpose new capital is required, for which the authority of the proprietors is necessary. A resolution empowering the Directors to create new debenture and ordinary stock to the aggregate amount of £55,000, to be sold by auction or tender, will be submitted to the proprietors for approval. The profit-sharing system, whereby the interests of the consumers, the proprietors, and the employees of the Company are identified, referred to at the last meeting, has been successfully started; and the Directors report with satisfaction that every man whom the Engineer could accept has assented to the conditions and signed an agreement. The Directors recommend that dividends be declared for the past half year at the rate of 5 per cent. per annum on the preference and ordinary stocks; amounting, less income-tax, to £14,410; and that the odd ⅛ per cent. of divisible profit be carried to the reserve fund.

The accounts accompanying the report show that, out of the £640,000 of capital raised, £612,658 had been expended at the close of last year. In the six months ending June 30 last, the expenditure on capital account came to £9129, of which £6262 was for buildings and plant, £2038 for meters, and £415 for stoves; the total outlay up to June being £621,789—thus leaving an unexpended balance of £18,211. The revenue account shows that the gas-rental for the half-year amounted to £57,541; the meter and stove rental, to £1333; residuals produced £20,479; and the total receipts were £79,386. With regard to expenditure, the manufacture of gas cost £47,891 (of which £30,543 was for coal); its distribution came to £5184; the management expenses were £3030; and the total expenditure was £61,071—leaving a balance of £18,315 to go to the profit and loss account. Among the items of expenditure is one of £946, profit-sharing for twelve months to June 30, The amount available for division is £20,134. With regard to the manufacturing operations, 42,074 tons of coal, 1061 tons of cannel, and 41,684 gallons of carburine were employed in the production of gas, of which 438,742,000 cubic feet were made. Of this quantity, 421,474,000 cubic feet were accounted for; and there were 5,367,000 cubic feet in store on June 30, as compared with 3,552,000 cubic feet at the end of last year. The estimated quantities of residuals produced were: Coke, 517,622 cwt.; breeze, 5185 yards; tar, 431,350 gallons; and ammoniacal liquor, 7988 butts. There were 367 tons of sulphate of ammonia made in the half year.

SHEFFIELD UNITED GAS COMPANY.

The Half-Yearly Report and Accounts.

The report of the Directors of the above-named Company, with the accounts for the six months ending June 30 last, has been issued, in view of the ordinary general meeting on the 11th prox. The amount available for distribution is £61,522; and the Directors will recommend the declaration of the maximum dividend authorized by the Company's Acts. This will amount to £37,255; and, after payment of it, the reserve fund will stand at £78,540—being only £7652 short of the full sum authorized. The Directors express their pleasure in being able to report that, in fulfilment of the promise made in October last year to lower the price of gas as soon as circumstances would allow, the Company's charges have now been reduced by 3d. per 1000 cubic feet.

The accounts accompanying the report show that £770,104 has been called up on capital account out of £1,068,482 authorized. The first-named sum has been increased to £776,215 by premiums; and of this amount there had been expended on June 30 last £720,540, of which £1063 was laid out during the six months covered by the report. The sale of gas produced £102,154; rental of meters and stoves, £5279; and residuals, £42,074. The total receipts were £150,189, as compared with £132,791 in the half year ending June 30, 1893. The principal items of expenditure were as follows: Manufacture of gas, £73,407 (coals costing £38,889); distribution, £8312; rents, rates, and taxes, £8101; and management, £4822. The total expenditure was £95,416, as compared with £97,456 in the corresponding period of 1893. Then there was a balance of £35,335 to go to the profit and loss account; now there is one of £54,773. With regard to the manufacturing operations, 75,513 tons of coal and 15,053 tons of cannel were carbonized in the six months. The production of gas is not stated in the accounts; but the estimated yield of residual products is given as follows: Coke and breeze, 54,721 tons; tar, 5991 tons; ammoniacal liquor, 2,907,000 gallons. The works are under the immediate supervision of Mr. Fletcher W. Stevenson, Assoc.M.Inst.C.E.; the General Manager of the Company being Mr. Hanbury Thomas.

Barnet District Gas and Water Company.—At the half-yearly general meeting of this Company on the 23rd inst., the Directors will report a balance of £15,364 available for distribution. Out of this they will recommend a dividend at the rate of 9 per cent. per annum on the "A" and "C" stocks, 8 per cent. per annum on the "B" stock, and £6 6s. per cent. per annum on the "D" (water) shares. The business of the Company continues to progress.

The Colne Gas and Water Works.—The Colne Local Board have petitioned the Privy Council for a charter of incorporation; and at the preliminary inquiry recently held on the subject, the Clerk gave a history of the town's affairs, including the acquisition of the gas-works by the Board. It was in 1877 that the Royal Assent was obtained for the Colne Gas Bill; and the works were purchased by the Local Board for £33,000. Down to 1890, an additional sum of £11,211 was spent upon extensions; and during that time the consumption of gas increased from 25,000,000 to 64,662,000 cubic feet. In 1890, a Provisional Order was obtained for borrowing £22,000; and with this sum the gas-works were completely remodelled. In 1877, the price of gas to the ordinary consumers was 4s. 2d. per 1000 cubic feet; and it is now 3s. The capital at the end of the past financial year was £66,155. In 1881, the Board purchased the water-works for £13,500; and since then, by extensions, the capital had been increased to £65,258.

PROVINCIAL GAS AND WATER COMPANIES.

The reports and accounts noticed in the following paragraphs were received during the past week.

Gas Companies.

The last meeting of the shareholders of the Accrington Gas and Water Company was held yesterday afternoon. The *agenda* contained not only a resolution for winding up the Company (whose undertakings have been purchased by the Local Authorities), but also one for the "disposition" of three sums of money—viz., £8087 12s. 7d., £809, and £5000—which the Directors have in hand besides the ordinary dividends. The Directors, in their final report, say that the expenditure on capital account to June 30 has been £289,471, of which £1289 has been spent during the past six months. The profit made during the half year was sufficient to allow of the payment of the maximum dividends, and "also to divide the sums of £8087 12s. 7d. and £809, which have been transferred to this account for the purpose, among the holders of 'A' and 'B' stock, in accordance with the agreement with the Local Authorities." The first-named amount is described as "undivided profits;" and the smaller one as "balance." The £5000 is what has been paid as bonus. As stated above, the works are being taken over by the Local Authorities; and they will in future be worked by a Joint Gas and Water Board. The Accrington Corporation elect eight representatives to the Board; and the four Local Boards (Harwood, Rishton, Clayton-le-Moor, and Church), two each. The first meeting of the Board will be called by the Town Clerk of Accrington, who will, in all probability, be appointed Clerk to the new authority.

Reporting upon the results of the operations of the past half year, the Directors of the Ascot District Gas Company refer to the accounts as being "very satisfactory;" showing, as they do, a profit of £760. After providing for every charge against the half-year's working, they are enabled to write off £260 from the preliminary expenses, and have a balance of £748 at the credit of profit and loss account, out of which a dividend has been declared at the rate of 2½ per cent. per annum (less income-tax). The Board mention that the business of the Company is progressing in a gratifying manner; and they announce, with deep regret, the decease of their colleague, Mr. A. Williams.

The income of the Ashford Gas Company during the past twelve months has exceeded the expenditure by £2102; and this has enabled the declaration, on the recommendation of the Directors, of a dividend of 10 per cent.; with a bonus of £3 in respect of each £10 share. To meet the cost of new works, 1400 new £5 shares are to be issued.

The Directors of the Chesterfield Water and Gas Company in their half-yearly report briefly announce that the Bill which they promoted in the last session of Parliament did not receive the sanction of the Parliamentary Committee, who, it will be remembered, added to their decision the opinion that the supply of water and gas should be undertaken by the Corporation, and that the concern should be purchased by them on fair and reasonable terms. In pursuance of this decision, the Corporation have, the Directors state, appointed two gentlemen to meet two gentlemen selected by the Board to negotiate and, if possible, arrange such terms for the sale and purchase of the whole undertaking as the respective negotiators can recommend for adoption by the shareholders and by the Corporation. These negotiations are now pending. It is also mentioned by the Board that, in order to meet the financial requirements of the Company, they have decided to make a call of £2 per share on the 3387 shares created and issued in 1878. Turning to the accounts, it is seen that the total capital expenditure to date amounts to £180,604, of which £88,978 has been spent in connection with the water department, and £91,625 upon the gas undertaking; there being, on June 30 last, an unexpended balance of £1241. The total income for the past six months was £9738; and, deducting expenditure, the balance of revenue is £4709—the net profit being £4312. The balance at the credit of the net revenue account is £5956, from which it is proposed to pay dividends of 2½ and 3 per cent. on the various classes of capital for the half year, which will absorb £4420.

In the report (which is signed by the Secretary, Mr. Denny Lane) presented by the Directors of the Cork Gas Consumers' Company at the half-yearly general meeting of shareholders yesterday, they stated that the steady expansion in the business which they had had to record for some time past continued unabated. This increase had, however, to be discounted by the fact that the season of 1893 was probably the finest ever experienced in the South of Ireland, while the weather of the current year is quite the reverse. The market for most of the residual products has improved; and sulphate of ammonia has somewhat recovered from the extremely low price to which it had fallen. Although the value of the plant has largely increased, the Directors have not for many years made any addition to the insurance fund. It has therefore been deemed advisable to add £200 to the fund; bringing it up to £2000. The Directors have long been anxious to lower the cost of gas to the consumers; and although no complaint of the price has recently been made, they feel that they can, next year, without injustice to the proprietors, reduce the charge both for the public lights and to the private consumers. Of course, they have to guard against the contingency of another disturbance in the coal trade; but if such an event does not occur, they propose to take 3d. off the price of gas from mid-winter. The proposed reduction will be a saving of about £2500 to the Corporation and the private consumers. The result of the half-year's working was a balance of £8650; and the amount available for distribution was £5995. Out of this sum the Directors recommended the payment of the ordinary dividend at the rate of 8 per cent. per annum. This would absorb £5676, and allow of £319 being added to the reserve; bringing it up to £13,964. The Resident Engineer (Mr. T. Travers) reported that the erection of eight settings of retorts with gaseous furnaces had been completed during the half year, at a cost under the original estimate. They were put in operation some months since, and were giving satisfactory results. He stated that, in the saving of fuel alone, the economy achieved would repay the extra outlay in a short period. In point of production of gas per retort, they were performing much more than the duty of the previous system of settings; and thus they would make an important saving in the future outlay for plant. Alterations to one of the holders are in progress which will make it practically new, and increase the storeage capacity by 100,000 cubic feet, as compared with last winter. The works generally have been maintained in good condition.

In the brief report accompanying the accounts of the Dover Gaslight Company, the Directors remark that the results of the past half year confirm the accuracy of the estimates upon which they based the recent reduction in the price of gas; the profits for the six months being sufficient to pay the full parliamentary dividend, and leave £14 to be carried forward. They accordingly recommend the declaration of a dividend at the rate of 7½ per cent. per annum, less income-tax. The profit and loss account shows that £10,698 was received for gas; £3526, for coke, tar, and other residuals; £530 for meter and stove rental, &c.; and the sum of £141 represents interest on reserve fund investments—making £14,896. After meeting all expenses, £2702 remains as profit. The undivided balance brought forward from previous years is £3039.

The shareholders of the Kendal Gas and Water Company met for the last time on the 14th inst., under the presidency of Mr. W. D. Crewdson. The Secretary and Manager (Mr. T. N. Ritson, Assoc. M.Inst.C.E.) read the report of the Directors, in which it was stated that the profits for the year ending June 30 amounted to £4259; being an increase of £757 on those of the preceding twelve months. The Directors considered this most satisfactory, taking into account the fact that the recent coal strike compelled them to purchase large quantities of coal at an increased cost of more than £350. An interim dividend at the rate of 6 per cent. per annum was paid for the December half year, which, with interest on bonds, bank interest and commission, &c., for the year, absorbed £1228; leaving a balance of £3031. Under the agreement with the Corporation of Kendal, the ordinary shareholders would receive a dividend for the past half year at the rate of 6 per cent. per annum; and the preference shareholders would have their fixed dividend of 7½ per cent. per annum. There would be, in addition, interest at the rate of 4 per cent. per annum on the purchase-money—viz., £80,000— from June 30 to Aug. 20, 1894. The gas-rental had decreased, owing to the unusually mild and bright weather, and other exceptional circumstances; but the water-rental had increased by £212. The Bill for the purchase of the concern by the Corporation having received the Royal Assent, the transaction was on the point of completion. As this was their last annual report, the Directors thanked the shareholders for their constant and considerate support, and expressed the hope that the working of the undertaking might, in the future as in the past, be for the benefit of the town. The Chairman, in moving the adoption of the report, gave an outline of the history of the Company, which had, he said, been in existence, in two successive forms, for close upon seventy years. The gas-works were founded in 1825; and the water scheme was undertaken and carried into effect in 1846. They had had their ups and downs, like many other companies; but, on the whole, he trusted the results had been satisfactory from the shareholders' point of view. Perhaps the best illustration of this was the fact that, in disposing of the concern, their £20 shares had realized £38; and the £10 shares, £21 14s. 6d. The profits on the sale of gas amounted to £2962, as compared with £2120 in the year ending June 30, 1893; while those realized by the supply of water came to £1297, as against £1381. The gas-rental was £6620; and the water-rental £2959. The result, shortly stated, was that, after paying a dividend of 6 per cent., the Corporation, if so disposed, could wipe off the sum standing to the Marcellus Thompson suspense account, and have a surplus to the good of £500 in addition. There would be a small balance of about £150 for the shareholders to dispose of. The report was adopted. Resolutions were then passed appointing the Chairman and two other Directors to receive the purchase-money, costs, &c., and authorizing the Board to do all necessary acts in connection with the transfer of the undertaking. A discussion then took place in regard to the disposal of the balance alluded to by the Chairman; and in the result, it was resolved that it should be distributed *pro ratâ* among the shareholders—a proposition that it should go to the Directors not being generally entertained. A vote of thanks having been accorded to the Chairman and Directors, Mr. Crewdson, in acknowledging it, said the Company had been served by an earnest, steady, respectable set of men, who had done their work admirably. Mr. Ritson was present; and so he (the Chairman) could not say all he would wish about him and the staff. The best compliment he could pay him was to point to the figures of the report, and say what they all knew, how much he had contributed to the satisfactory result shown. He would have been glad if the shareholders had seen their way to have made some recompense to Mr. Ritson out of the surplus. However, they had decided differently; but he might say, without divulging any secret, that the Directors would be pleased to make a presentation to him out of their own pockets. The proceedings then terminated.

The Directors of the Leatherhead Gas Company congratulated the shareholders at their recent meeting on the continued prosperity of the concern. The favourable return shown in the balance-sheet would justify, they stated, the declaration of a somewhat higher dividend than had been paid in recent years; but taking into consideration the state of the labour market, and bearing in mind the fact that extensive additions to the plant might ere long be necessary, it was most important to have a substantial reserve to meet contingencies. Moreover, it was thought desirable that a reduction should shortly be made in the price of gas to private consumers. Under these circumstances, the Board recommended a dividend at the same rate as that paid for the last few years—viz., 8s. per share, making 8 per cent. for the year. A substantial balance would then be carried forward. A very favourable contract for the supply of coal, it was mentioned, had been made for the current year. The recommendation was agreed to.

The Mirfield Gas Company have realized a profit of £2141 during the past half year; and the Directors recommend a dividend of 10 per cent. This will require £2150; and the small deficiency will have to be taken from the balance of undivided profits.

At the half-yearly general meeting of the Newport (Mon.) Gas Company on Monday last week, the Chairman (Mr. E. J. Phillips), in moving the adoption of the report, said the dividends would be the same as in the previous half year; and after they had been paid, there

would be a balance of £1300. This was a position in which they had not been for some years past. It was fortunate that they had been able to do so well without having to increase the price of gas. Then it was a matter of satisfaction that the Engineer (Mr. T. Canning, Assoc.M.Inst.C.E.) had reported the works to be in an efficient condition. There had been 4½ million cubic feet more gas made in the past than in the preceding half year; while its illuminating power was 2½ candles higher than was required. Referring to the electric light, which the Corporation are providing for the town, he maintained that, on the question of cost, it could not compete with gas. Alluding to the last issue of stock, he said the £6000 worth offered for sale produced a premium of £2092. Dr. Brewer seconded the motion; and it was carried. In acknowledging a vote of thanks to the Directors, the Chairman said in their officers—both the Secretary (Mr. Marfleet) and the Engineer—they had capable servants, whose assistance was very valuable.

The report submitted by the Directors at the half-yearly meeting of the Rochester, &c., Gas Company last Thursday week, stated that the undertaking continued to be successful. The enlargement of the mains from the Gillingham works had been completed; and the supply of gas to the New Brompton and Rainham districts was consequently now in a satisfactory condition. It had also been considered desirable to replace the station meter at the Rochester works by one of larger capacity, owing to the increased quantity of gas manufactured. The Directors spoke with regret of the death of Mr. W. Syms, who was for nearly 37 years the Secretary and Manager of the Company; and in consideration of his long services, they had granted an annuity to his widow. To fill the vacant position, the Directors had appointed Mr. J. M. Veevers, who, for fifteen months previously, occupied the post of Assistant Secretary, prior to which he had been for ten years the Manager of the Denton Gas-Works. The report was adopted; and dividends at the rates of 10 and 7 per cent. were declared.

At the half-yearly general meeting of the Scarborough Gas Company on the 11th inst., the Chairman (Mr. B. Fowler, J.P.), in moving the adoption of the report and accounts, noticed in the JOURNAL for the 7th inst., remarked that the quantity of gas sold in the past half year had risen by 2½ million cubic feet, while during the year the increase had been nearly 6 million feet; and this notwithstanding the decrease of 3½ million feet in the quantity of gas used by the Corporation for public lighting. The growth in the consumption of gas was due chiefly, he thought, to the extended use of gas cooking and heating appliances. The Company had 860 cooking-stoves alone out on hire in the town. There had been a large increase in the receipts; and he was pleased to say that the payments were £265 less than in the corresponding half of last year. This was owing to the decreased cost of manufacturing gas. They had greater receipts, less payments, and a better quality of gas; and this was satisfactory to everyone. From the capital account, £952 had been expended, to a large extent on new meters and cooking-stoves; the former including "penny-in-the-slot" meters, which answered very well in the interests of the Company. The report was adopted; and the dividends recommended were declared. A vote of thanks having been proposed to the Chairman, a shareholder called special attention to the valuable services of the Manager (Mr. J. Holliday, Assoc.M.Inst.C.E., F.C.S.) and the staff. He said that during the half year £16,956 had been collected, and the whole of the bad debts amounted to only £51 15s., which showed that great labour and care must have been exercised. There were 4550 ordinary consumers, 220 monthly consumers, and 70 consumers by "coin" meters; and a loss of £51 on the money to be collected from all these consumers was very small. A vote of thanks to the Manager and officers having been incorporated in the motion, it was carried, and briefly acknowledged by the Chairman. Subsequently the meeting was made special, and a resolution passed authorizing application to Parliament for power to raise £100,000 of additional capital.

The Wakefield Gas Company have had a successful half year; and the balance available for division among the shareholders is £7017. Dividends at the rates per annum of 11½, 9, and 8½ per cent. have been declared on the various classes of shares.

The half-yearly report of the Yeadon and Guiseley Gas Company states that the total income for the past six months amounted to £4936. This includes £3869 received for gas and meter rents, and £1020 for residuals. The expenditure totalled to £3519; leaving a balance of £1417. From this profit, the Directors recommend the maximum dividend of 10 per cent. on the consolidated stock, and 7 per cent. on the new shares, which will absorb £1200, leaving about £200 to be carried to the reserve fund.

Water Companies.

The accounts of the Chester Water Company for the past six months show a surplus of revenue over expenditure of £2827. Adding to this the balance of £5180 from the previous half year makes £8007. The interest on preference capital will absorb £450; leaving a balance of £7557. The Directors report that the expenditure on the filter-beds has been especially heavy; but they are of opinion that this outlay is fully justified by the improvement in the quality of the water supplied. In the course of the current half year, one of the engines at the upper works will have to be replaced. Dividends at the rates of 6, 7, and 7½ per cent. have been declared on the various classes of capital.

The receipts of the Leatherhead Water Company for the past half year amounted to £1168; and the working expenses to £562—leaving a profit of £605 (an excess of £189 over the corresponding period of 1893). Adding to this the balance brought forward (£300) makes a total of £906. Deducting from this £125, the interest due on debenture stock, there remains £781 available for division among the shareholders; and it has been decided to pay a dividend at the rate of 3 per cent. per annum, leaving £419 to be carried to the next account.

The income of the Woking Water Company for the past half year has been £2940; and the expenses on revenue account, £1360. The balance carried to profit and loss account is £1580; and the amount available for division, £1498. The Directors recommend the payment of an interim dividend at the rate of 4 per cent. per annum (free of income-tax), which will absorb £1359; leaving £139 to be carried forward. The expenditure on capital account has been £82,825.

THE BRADFORD CORPORATION AND THE RIVAL OIL-GAS PROCESSES.

The Quarterly Meeting of the Bradford Town Council was held on Tuesday last—the MAYOR (Alderman Whitley) presiding. The greater part of the time devoted to the proceedings was occupied by a debate on the question of the oil-gas experiments, to which several references have been made in recent issues of the JOURNAL.

Alderman MOULSON, the Chairman of the Gas and Electricity Committee, opened the discussion by moving the adoption of the minutes of that Committee, with the exception of two resolutions—one accepting the offer of Messrs. R. and J. Dempster, Limited, and the other the offer of the Northern Counties Hydro-Oxygen Gas Company, to provide and fix apparatus for manufacturing oil-gas by their respective processes at the Corporation gas-works. The minutes stated that, at a meeting held on Aug. 8, a letter was read from Mr. W. W. Shaw asking the Committee to postpone consideration of any oil processes other than that known as Dr. Dvorkovitz's process until the same had been tested, but that the Committee did not feel at liberty to comply with the request. A resolution had been passed accepting the offer of Messrs. R. and J. Dempster, to fix apparatus at the Valley Road gas-works for manufacturing oil-gas by the Peebles process, subject to terms submitted. A second resolution had been adopted, accepting the offer of the Northern Counties Hydro-Oxygen Gas Company, to fix apparatus at the Birkshall gas-works for manufacturing hydro-oxy oil-gas by the Tatham system in conjunction with Brin's oxygen process, subject to terms of an agreement to be prepared by the Town Clerk. Alderman Moulson said that his reason for excluding the minute relative to the further experiments in connection with the oxy-oil gas lay in the fact that the resolution in question was only adopted by the casting-vote of the gentleman presiding at the Committee meeting. There were 10 members out of a total membership of 29 present at the time; so that, all things considered, he thought it advisable to withdraw the proposition. The great advantage in connection with the experiment actually in progress was that, in the event of failure, they would have nothing to pay. Under the Peebles process, there was a preliminary outlay of £1200, on which the proprietors would require to be paid 7½ per cent. during the experimental stage. If it proved a success, they would require, after being paid for the plant, a royalty of 2s. 6d. per ton on the oil used. The Northern Counties' process (which was in use at Huddersfield) needed a plant costing £4000. On this outlay, the proprietors would want 7½ per cent. during the experimental stage, and 4d. per 1000 cubic feet upon the enrichment made. The Corporation would, in addition, have to pay £2 a week for a trained man to superintend the working. If, after two years, the system proved a success, the Corporation were to pay for the plant, and 4d. per 1000 cubic feet for three years. At the end of the three years, the royalty was to be increased to 8d. There was the disadvantage in connection with the Huddersfield process, besides the heavier cost of the plant, that, if the Bradford Corporation Engineer thought it a failure, the proprietors could claim to have the matter referred to some high authority in the engineering world. It seemed to him (Alderman Moulson) that, in taking up this system, the Corporation might be laying themselves open to a nice little lawsuit. Of course, they could give either of the systems a trial at some future date; and personally he was in favour of waiting a little time before making any movement in that direction.

Alderman MORLEY seconded the motion.

Mr. LOUIS WALKER moved an amendment to the effect that the minutes should be approved as they were submitted by the Committee. He explained that he did not take this course because he wished the experiments to proceed, but simply because he desired to be able to make some remarks on the subject. The whole matter, from beginning to end, seemed to him to have been of bad odour. He had been approached with the object of getting his support for the Huddersfield process. But he had never given way to that kind of thing; and he hoped he never would do so. He would like to ask how many members of the Gas Committee could say that they were not mixed up with the Huddersfield process. Let each member come forward and say whether or not he was connected with the Company that owned this process. He did not say that there were no merits in the system which was being pushed; but he held that the experiments should not be embarked upon under the circumstances to which he had alluded. Having made these remarks, he begged to withdraw his amendment.

Alderman WOOD inquired whether a Chairman of Committee was in order in withdrawing any portion of a Committee's minutes on his own responsibility?

The TOWN CLERK: You can have it either way you like. If you force the minutes before the Council, the Chairman can move an amendment.

Mr. J. SHELDON said that Mr. Louis Walker had put the other members of the Council in a rather awkward position. He had moved an amendment, proceeded to ventilate his own views, and then withdrew the amendment without giving the other members an opportunity of speaking.

Mr. W. C. DIXON thought it high time that the whole question was settled one way or the other; and he assured Mr. Louis Walker that, in anything he (Mr. Dixon) said or did, he was actuated solely by a desire to serve the interests of the ratepayers. The Sub-Committee appointed to consider the matter had investigated the merits of the various systems. That of Dr. Dvorkovitz (known as Smith's process) had been adopted for trial at the gas-works; and it was felt that the experiment could not be regarded as conclusive unless another system was tried with it. The Dvorkovitz process was to be experimented with on the principle of "no cure, no pay;" and if it proved a failure, it would cost the ratepayers nothing. The Northern Counties Company had made several offers of terms for a trial of their process. First they suggested taking as payment for the plant half of what the Corporation saved by the process during five years. But the Sub-Committee anticipated that the saving might amount to £32,000, of which the Company would be entitled to £16,000; and they thought this a heavy price. Then the Company said they would accept half

the saving for three years. Still the Sub-Committee demurred; and then the Company came down to the terms which Alderman Moulson had stated. If the system was as good as the proprietors represented, it should save Bradford something like £8000 in a comparatively short period; and the reports from Huddersfield confirmed the statements of the Company on this point. If they could find any other system which came within 30 per cent. of the one in use at Huddersfield, he would cease to push the latter. The Peebles process admittedly made 25 per cent. of refuse; and the proprietors would not guarantee that it would not make more, whereas the Huddersfield process only made 4 per cent. of refuse. From a ton of oil, the Huddersfield process produced 27,000 cubic feet of 70-candle gas; while the Peebles system yielded 22,000 cubic feet of 50-candle gas. The balance in favour of the Huddersfield process was thus 74 per cent. Taking the comparison on the basis of enrichment, he found that the balance was still greatly in favour of the Huddersfield process. The opposition to such a system showed him that there was something behind the scenes. In urging its claims, he was advocating a good cause, and that was the reason he was so persistent in pushing it. If the system was not given a trial, he would fight the question out among the working men of the town. The suggestion that the Corporation should, after trial, have power to reject the system without payment, even if it proved a success, was manifestly absurd; and they could not expect any man outside Bedlam to agree to such terms.

Mr. J. Hayhurst said Mr. Dixon's speech reminded him of quack medicines, whose only value lay in their testimonials. The Huddersfield system came into the field first. But to-day the Peebles process was working in seventeen towns; and works were in process of construction in ten other places. On the other hand, it was remarkable that no other town in England was ready to take up the Huddersfield system. The whole argument of some of the members of the Gas Committee was: "Let us have the Huddersfield system at any price;" and when they thought that that system was likely to go to the wall, they said they were willing that both processes should be tried. Five of the members voted against the proposal to try both, and four for it; and then the Chairman gave a vote, and afterwards a casting-vote, and so turned the tables. The majority of the Committee thought that for the space of one month they could afford to wait, and let the testimonials be put to the test; and thereby save the town perhaps an expenditure of £6000. They could let the 27 corporations who would shortly have the Peebles process working test it. The most fatal argument against the Huddersfield process was that no other corporation would take it up. The promoters of this system said: "If your Gas Engineer says it is a failure, we must call in some practical engineer." If the process was what Mr. Dixon claimed for it, there would be no fear whatever of allowing the Corporation to take it up, because, if it would save 75 per cent., they would not want to refer the matter to arbitration at all. He thought that the Council could afford to wait for one month until the process which they were now trying had been tested. If it were a success, they could apply it to the whole of the works, and not divide the energy of their Engineer by taking up the other two processes.

Mr. J. Walker remarked that no attempt had been made to upset Mr. Dixon's figures. As to the preponderance of places using the Peebles system, the 27 towns mentioned by Mr. Hayhurst, if all put together, were little bigger than Bradford. He protested against Alderman Moulson withdrawing resolutions without obtaining the approval of his Committee, especially as he was not at the meeting where the resolutions were passed. Only a month since the Chairman had brought forward the Peebles system as the one to be tried against Mr. Smith's; but now he was opposed to it. There were undoubtedly a number of people in Bradford besides Mr. Smith who were interested in the process; and he had no doubt that there were some within the circle of the Council Chamber. Smith's system had been tried in Birmingham, and had been taken away as a complete failure. Mr. Smith had then brought it to Bradford—his native town—and suggested that he was prepared to give the Corporation something for nothing. If Birmingham would not have it, Bradford must. He did not see what good would be done by referring the question back. If the matter were deferred for another month, neither the Huddersfield nor the Peebles system could be put into working order for the coming winter. The royalty for the Huddersfield system would only be about £400 a year; and he believed the owners were prepared to prove that it would save £8000.

Alderman Edhouse thought the Huddersfield process would not suffer by being put off for two or three months, and added that he objected altogether to the system of royalties.

Alderman Morley defended the action of Alderman Moulson, who felt that he could not move the original resolution of the Committee because he was opposed to it. Mr. Smith, he stated, had withdrawn his system from Birmingham voluntarily, because the Engineer there would not carry out the ideas suggested, and preferred to work on his own lines. He (the speaker) was not interested in either system; but he was convinced that they would do better to wait for another month or two, and see how Smith's process was likely to go on. He had heard it said that there were doubts as to whether any royalties could be charged on any of these systems.

Mr. W. E. Aykroyd observed that Alderman Morley quite ignored the fact that for years before Smith's system was under trial at Birmingham, it had been tried and worked under the careful supervision of the original proprietor, but had turned out a dead failure. He did not think there was anything to choose between the Peebles and Smith's systems, except that the former was more developed. If the Peebles system, which produced between 25 and 40 per cent. of coke, was a success, surely the Huddersfield process with only 4 per cent. of coke, would be a still greater success. He thought all three systems should be tried.

Alderman F. Priestman hoped the Council would be careful not to tamper with the magnificent property they had in the gas-works. He thought they had begun at the wrong end. They ought to have first tried in the laboratory what was the effect of the various enrichments upon Bradford gas. They might have had samples of the gas in cylinders, and have found by experiment the effect of the different additions. It was impossible to put these hydrocarbons into illuminating gases without producing effects which would be almost fatal to the system. There would be smoky burners, and consequently an outcry from the consumers. He believed that, supposing they really wanted it, if the Council would only wait, they would be able to put down the Huddersfield system presently without paying any royalty whatever, and make their own oxygen and oil gas. Enriching by oil was as old as the hills. The only difference between the old and the new method was that there were now better means of production, by which a larger quantity of gas could be obtained from the oil. Some years ago enrichment by petroleum was tried in Bradford. The mains were opened; and the petroleum was poured in. The gas being warm, some of the volatile petroleum was taken up, and the gas enriched. The result was smoke at the burners; and the consumers could not bear to have it. Ten years ago he went to Sheffield. They had there a system at work of making oil gas for enrichment; and they said they would never use cannel again. Yet the system had "gone to the wall." As to the new processes, there was not a gentleman in the Council who, if the gas-works were his own, would try the three together. They might compare them in the laboratory, but not in the gas mains or works. In conclusion, he asked the Chairman how many tons of cannel were included in the contracts, and whether these contracts had been effected at less prices than before.

Mr. J. Freeman expressed his astonishment that the Chairman of the Gas Committee should have taken upon himself the unusual course of moving what was nothing more nor less than an amendment to the original resolution submitted by himself. It seemed to him that the Chairman had not the strength of his own conviction on the matter, and that he had from time to time shown a want of that knowledge of the subject which should be possessed by a gentleman in his position. He felt pleased that they had had a touch of the old master's hand from Alderman Priestman.

Mr. R. Pratt said they appeared to be at a deadlock with regard to this matter; and he believed it would be to the advantage of the Council to have the whole question withdrawn and reconsidered by the Committee.

Mr. Louis Walker observed that he had simply moved the amendment for the purpose of "getting in." Would, he asked, any business man give £4000 with 7½ per cent. interest running, when he could get the same thing for £1200 under the Peebles system?

Alderman Moulson, answering first the question put by Alderman Priestman, said the orders which had been given for cannel amounted to about 75,000 tons; and the price was slightly under that of last year. There were still some 85,000 tons to be supplied under old contracts, which had not been sent in owing to the coal strike; and there were about 30,000 tons now in stock. With respect to the statements that he had taken the question of the oil-gas into his own hands, he wished to say that he had been away from home, and only returned on Monday evening. He had seen the Town Clerk that (Tuesday) morning, and had some talk with him upon the matter. After it had been discussed, the Town Clerk suggested that the minutes should be adopted. Proceeding, Alderman Moulson said that as to what Mr. Freeman had stated, he would answer that he had the courage of his own convictions. He had, he hoped, carried out his opinions during a large number of years, and thought he was quite capable still of holding his own views, and carrying them out as far as he could.

The amendment—that the minutes should be adopted, including the two resolutions relating to the Peebles and Northern Counties Company's systems—was then put to the meeting, and was defeated by 22 votes to 20.

Mr. Cowgill proposed another amendment to the effect that the Northern Counties Hydro-Oxygen Gas Company's process should be tried, and not the Peebles.

Mr. L. Walker said he had no objection to second that. He had been moved to take the action he had done because he wished to defeat the object of a certain clique. He objected to the ways of the clique, and had resorted to his own methods in order to defeat them. So far, he had managed. He was using the same methods to thwart the efforts of the clique that the clique had used with the object of attaining their own ends.

Mr. Dixon said Mr. Walker had throughout the consideration of this matter been opposed to reason and common sense. One cause why he supported the Huddersfield scheme was that he had studied its working thoroughly. With regard to the system now being tried by the Corporation, it was undertaken because Mr. Isaac Smith's name was in reality behind it; and the reason for putting off the question was simply to try to show the system was something it was not.

Alderman J. Hill said it was strange that, outside Huddersfield, none of the corporations or big gas companies seemed to have adopted the system the merits of which were being so strenuously urged. It was certainly not because the system had not been made widely known, for at a conference of gas engineers held some months ago a paper was read urging the claims of the Northern Counties Company's process. Despite that fact, none of the gas engineers seemed to have recommended their employers to take up the process. As for the course suggested by Alderman Moulson, a little delay would probably put the Corporation in a better position for making terms; and at any rate their knowledge of the circumstances affecting the various processes would be fuller and better.

The amendment was put, and declared to be defeated by 23 votes to 15. The original motion was then formally approved.

Belfast Corporation Gas Department.—The Gas Committee of the Belfast Corporation met last Thursday, and received a report from their Engineer and Manager (Mr. J. Stelfox) upon the financial position of the undertaking for the year ending June 30. The gross profits were £28,484, or nearly £7000 less than the previous year—a state of affairs attributed to the coal strikes. The position is considered very satisfactory, as, but for the econony which the Committee were enabled to exercise by the introduction of water gas, and by the cancelling of certain coal contracts entered into at very high prices during the strikes, the reduction in the profits would have been much greater. Coke sold higher than in the previous year; and a quantity was used in the manufacture of the water gas.

THE INSPECTION OF GAS-LIQUOR AND OTHER WORKS UNDER THE ALKALI ACT.

The Sub-Inspectors' Reports.

In the JOURNAL for June 5 (p. 1077), we dealt with the report of the Chief Inspector under the Alkali, &c., Works Regulation Act, 1881 (Mr. A. E. Fletcher), for the past year. We now give a few extracts from the reports made to him by the Inspectors of the various sub-districts. These are: (1) Ireland, Mr. E. G. Ballard; (2) North of England, Mr. B. E. Smith, F.I.C., F.C.S.; (3) Cheshire, North Wales, and part of Lancashire, Mr. E. G. Ballard, with whom is associated Dr. J. Affleck, as an additional Inspector for the Widnes sub-district, comprising Widnes and Runcorn; (4) East Lancashire and Yorkshire, Mr. R. Forbes Carpenter, F.I.C.; (5) South Midland, Mr. E. Jackson, F.I.C., F.C.S.; (6) South-West of England and South Wales, Dr. A. C. Fryer; and (7) South-East of England, Mr. F. N. Sutton, F.I.C. Scotland (which is under the inspection of Mr. W. S. Curphey) is, as usual, the subject of a separate report.

In Ireland there are 26 sulphate of ammonia works, which Mr. Ballard says are carefully conducted. In one case, however, owing to the burning of the sulphuretted hydrogen being unsatisfactory, an oxide purifier was advised and adopted. Taking all the places where sulphate of ammonia is made in Ireland, the number of works with the continuous system of distillation is 11; with the intermittent system, 15; the number absorbing sulphuretted hydrogen in oxide purifiers, 16; and the number burning it, 10. There were 2950 tons of sulphate made in this district last year. Only five works are registered as tar-works; and but three of these are really for the distillation of tar. Where this operation has been carried on, means for dealing with the noxious vapours have been provided.

In the North of England, there are 39 sulphate of ammonia works, and two others in which gas liquor and liquid ammonia are produced. The majority of the first-named works, of course, obtain their ammoniacal liquor as a bye-product from the manufacture of gas; but Mr. Bernard Smith reports that an additional large plant for the manufacture of coke by the Simon-Carvès process was built and started during the year—making three at work in the district. From this source, 810 tons of sulphate were obtained out of the 6320 tons which constituted the total output for the district.

In the portion of district No. 3 which is under the supervision of Mr. Ballard, there are 25 sulphate of ammonia and 6 gas liquor works. He reports that all the former works were carried on in a satisfactory manner. The continuous system of distillation is adopted in 17 works; the intermittent system in 10; the sulphuretted hydrogen is absorbed in oxide of iron in 17; it is burnt either under boiler fires or in retort-flues in 9; and in one it is converted into sulphur in a Claus kiln. In Dr. Affleck's district, there are three works and four plants for the production of sulphate and muriate of ammonia. One of the plants was idle all last year; and the other three produced of the two salts a quantity equivalent to 976 tons of ammonium sulphate. The works were maintained and conducted in a satisfactory manner; and no complaints were made of them. The escaping sulphuretted hydrogen continues to be treated as before. In one works it is absorbed in a dry, and in the second in a wet oxide purifier; while in the third (the quantity being inappreciable) it is burnt under the boiler fires.

In the East Lancashire and Yorkshire district, Mr. R. Forbes Carpenter reports that only one new works for the treatment of gas liquor was registered during the past year; while four were transferred to the North of England district. The total quantity of gas liquor worked up into sulphate and muriate of ammonia, as well as into liquor ammonia—crude, refined, and anhydrous—was equivalent to 24,320 tons of sulphate. This figure shows a reduction of 405 tons below that of 1892; but it is more than accounted for by deficiency of make at two works. At one of the works of the Bradford Corporation, an explosion took place at the close of 1892, which wrecked part of the condenser and scrubber plant. Until this could be reinstated, considerable loss of ammonia resulted, as the busy season of the year in gas making was then at its height. In one of the works carbonizing coal for the recovery of benzol, operations were suspended from the end of May till after the close of the coal dispute. Had these two figures been normal, a slight increase in the make would have again shown itself, as in former years. Mr. Carpenter remarks that the continuous processes of distillation increase in favour year by year; and that the demand for strong crude liquor ammonia for use in the ammonia-soda process does not tend to lessen, but somewhat to increase. The Claus process has received further extension by its adoption at one more works. For plants making from 400 tons of sulphate per annum and upwards, it works with regularity, and gives satisfaction in the way of minimizing nuisance. It is in works of this size that the cost of labour in charging and renewing the oxide in the purifiers becomes a not insignificant charge per ton of sulphate; and that occasionally motives of economy in the minds of the managers of works (usually gas-works) have to be kept in check by insistence on the part of the inspector that the object to be attained is freedom from nuisance, and having a necessary reserve of purifying space to meet variations in the quality and quantity of liquor used that are sure to occur in practice through a winter's working. Purifiers require at such times to be quickly emptied and refilled for use; and Mr. Carpenter says he has seen how there is a certain risk, in sending men to empty a box recently isolated, where the depth exceeds 3 feet (the depth being sometimes 6 feet), of their being overcome by the disengaged gases mechanically held by the oxide, as soon as they reach the lower layers, and their heads get near the level of the edge of the purifier. He has recommended strongly that provision should be made for the previous aëration of the purifier by blowing air mixed with steam to prevent undue heating, as by a Körting jet, for some two hours before the men are sent to empty the box. Another plan where chimney draught is already used for revivification of the oxide *in situ* is to have this connection put into use for the same period, and kept on while the men are at work. This draws any gases downwards away from the men; and there is no risk of their becoming insensible in a deep purifier, or even of their eyes being affected. Both plans are, he says, effective, and are an important adjunct where the purifiers are hard pressed. Revivification of oxide *in situ* by chimney draught downwards is practised at several works. The limit is the back pressure caused by the caking of the oxide on the grids and for some 9 to 12 inches above. At only one works is air driven upwards by a fan; and this is used not only when the distillation plant is idle, but when it is at work, and with very successful results as far as prolonging the life of the oxide is concerned.

In the South Midland district, there are some 69 works in which either the manufacture of sulphate and muriate of ammonia or the concentration of gas liquor is carried on. One works formerly making sulphate of ammonia was closed during the year; and two new works were started. The Sub-Inspector for the district (Mr. E. Jackson) found the works generally in good repair; and, with one or two exceptions, the purifying arrangements were satisfactory. The following are among some of the most notable improvements: In four works, where the oxide purifiers were rather too small for the make, requiring frequent changing, they have been increased in size. In one works, the oxide area has been more than doubled; at another, it has been much added to. In other works, new purifiers have been built, and continuous stills erected, replacing intermittent apparatus. The special plant for evaporating the spent liquor and recovering products therefrom at one of the works in the district is in successful operation. Some time ago the ammonia plant had to be stopped, owing to the difficulty in disposing of the spent liquor. This trouble has now been overcome. The waste liquor from this class of works is difficult to deal with satisfactorily in many cases. The offence is much diminished if the "devil water" is not allowed to flow away with it, containing sulphuretted hydrogen in the free state. The liquor should also be well settled, to deposit the carbonate of lime. One of the most notable improvements during the year in the direction of fuel economy was effected at one works. The spent liquor as it flows from the still is made to warm the gas liquor up to 130° Fahr. on its way to the superheater; and the saturator gases leaving the superheater heat the water supplying the steam-boilers. Thus the waste heat from both spent liquor and saturator gases is effectively utilized. Five works now use the Claus system of dealing with the noxious gas. Seven works continue to burn sulphuretted hydrogen for the production of vitriol.

In Dr. Fryer's district, embracing the South-West of England and South Wales, there are 70 works registered where the manufacture of muriate and sulphate of ammonia is carried on; and these produced 7100 tons of ammonia salts during the past year. In one works, the oxide of iron purifiers were found to be in a very foul condition; and Dr. Fryer feared that neglect and carelessness had a good deal to do with the cause of the evil. A sufficiently sharp warning was given; and it was intimated that no leniency need be expected in the future. During the past twelve months, three sulphate of ammonia plants were rebuilt; six works put up new saturators; four enlarged their oxide of iron purifiers; three added coke scrubbers or water condensers to their plants; and two now absorb the sulphuretted hydrogen in oxide of iron, when previously it was burnt under the boiler fires. A little more than 80 per cent. of the total sulphate and muriate manufactured in this district is made by the continuous, and only 20 per cent. by the intermittent process. During the year, one works adopted the former method. The ingenious form of saturator invented by Mr. C. Stafford Ellery, Engineer and Manager of the Bath Gas Company, referred to in the previous report, is still in use at their works. It is so constructed that the sulphate of ammonia settles to the lowest part of the funnel-shaped bottom, where a special valve is fitted to draw off the salt as it is precipitated. Mr. Ellery informed Dr. Fryer that a saturator 4 ft. 6 in. square would turn out 20 tons of sulphate of ammonia in six days; and, if it were working continuously, the output would be at the rate of 3 tons 10 cwt. a day.

The report on the South-Eastern district by Mr. F. Napier Sutton deals at some length with gas liquor and sulphate of ammonia works. During last year there were 82 works registered for the manufacture of ammoniacal compounds derived from gas liquor. Sulphate of ammonia was produced in every case; but in a few instances carbonate and nitrate of ammonia, liquid (refined) and anhydrous ammonia, were also manufactured. The total quantity of ammoniacal compounds produced during the year amounted to 39,400 tons, calculated as sulphate. This shows a decrease of 580 tons on the quantity produced in 1892. Mr. Sutton states that hitherto a large annual increase has always been shown; and the decrease last year was chiefly due to the exceptional freedom from fog in London during the autumn, with consequent diminution in the quantity of coal carbonized. The growing custom of carburetting gas by other means than cannel coal was, he says, also responsible to some extent. Two new works were registered during the year (both of them gas-works); and the apparatus erected for the manufacture of sulphate was of the most approved design—the sulphuretted hydrogen in each case being absorbed in oxide of iron purifiers. Mr. Sutton says: "There is little change to report in the methods adopted in the different works for the disposal of the sulphuretted hydrogen evolved during the distillation of the gas liquor. The greater portion of this gas, amounting to 60·8 per cent. of the whole, is utilized for sulphuric acid manufacture, by combustion in special furnaces or in the pyrites or oxide kilns connected with the acid chambers; 11·6 per cent. is treated by the Claus process for recovery of the sulphur as brimstone; 9·5 per cent. is treated by absorption in hydrated oxide of iron; and the remaining 18 per cent. is burnt in special kilns or under the boiler fires, and the resulting sulphurous acid escapes from the chimneys as such. I had hoped this year to have been able to report that the utilization of sulphuretted hydrogen for sulphuric acid manufacture had been adopted in the case of two additional works where this means of disposal exists. The proprietors of one of these works have abandoned the idea—for the present, at least; but in the other case, this desirable course is still under consideration. This method is now in use at four works, and is there carried out with the greatest success. Unfortunately there are drawbacks to the system which in some cases are deterrent to its adoption. The saturator gases contain a very large amount (60 per cent. or so) of carbon dioxide; and the mixture consequently requires an excess of air to thoroughly

oxidize the sulphuretted hydrogen. The resulting sulphurous acid is largely diluted with carbon dioxide and nitrogen; and these occupy valuable chamber space. The consumption of nitre for the further oxidation of the sulphur dioxide with sulphur trioxide is more extravagant than when the sulphur is derived from brimstone or pyrites. Therefore, with a limited chamber space, the adoption of this system is difficult and costly." The treatment of the sulphuretted hydrogen by the Claus sulphur-recovery process has been in use at five works during the year; and the adoption of this system is likely to extend. Three additional Claus plants have already been built—one at the works of a large suburban gas company; the second (in duplicate), at one of the London Companies' works.

With regard to the work of inspection, Mr. Sutton reports as follows: "The older established plants have been subject to constant supervision; and tests have frequently been made of the gases leaving the depositing chambers to ascertain if the best working conditions were maintained. Although the desired limited combustion expressed by the reaction—

$$2H_2S + O_2 = 2H_2O + S_2$$

was often found to be fairly attained, yet an excess of either sulphur dioxide or sulphuretted hydrogen was more frequently observed passing away with the waste gases, to be arrested by the limestone tower and oxide purifiers provided for the purpose. The general consensus of opinion now appears to be that better working results are obtained by the use of a slight excess of air rather than the reverse. This involves a slight loss of sulphur; and care has to be taken that no undue amount of acid passes the limestone tower, for this would detrimentally affect the efficiency of the oxide in the purifiers. The chief difficulty experienced in working this process is that of controlling the chemical action taking place in the kiln, and the difficulty of obtaining a complete deposition of sulphur in a reasonable space. It is strange that so many years' experience in the working of this process had led to no improvement in these two important points. The absorption of the sulphuretted hydrogen by hydrated oxide of iron is in use at 52 out of the 82 sulphate of ammonia works. This method of treatment is, therefore, very general with the smaller works. It has already been stated that 9·5 per cent. of the sulphuretted hydrogen evolved in the district is disposed of in this manner; and unless the number of works at which this particular method has been adopted is taken into consideration, the percentage figure may appear misleading. The chimneys in connection with the boiler fires or special kilns in those works at which the saturator gases are burnt, have been tested at intervals for the presence of unconsumed sulphuretted hydrogen and for the total acid compounds evolved. The average total acidity of the chimney gases (including acidity due to the sulphur in fuel) is 1·49 grains of sulphur trioxide per cubic foot. In no instance has the presence of sulphuretted hydrogen been detected. I regret to say that the treatment of this gas by oxide purification has been discarded at one rather large works; and the combustion method has been adopted in place of it. This is done in a special furnace, carefully and scientifically constructed; and the thorough oxidation of the gases appears to be effected. But it is a retrograde step." A notable number of improvements were made to the sulphate of ammonia and auxiliary plants throughout the district during the year. These included the substitution of continuous for intermittent stills, and additions and improvements to condensing and purifying plant. On two occasions Mr. Sutton had cause to complain seriously of defective plant; but no complaint from outside of nuisance arising from the manufacture of sulphate of ammonia was received by him, or came to his knowledge.

Reporting upon Scotland, Mr. W. S. Curphey states that the gradual but steady increase in the quantity of sulphate of ammonia made from gas liquor is beginning to be checked by two causes. In the first place, the extended adoption of electric lighting has, he says, a restricting influence upon the quantity of gas manufactured, and consequently affects the production of residuals. Then the recent introduction into several gas-works of the use of oil for gas making has also had a tendency to reduce the proportion of tar and liquor made. He points out that, in comparison with coal, these residual products from oil may be said to be *nil*; so that the more oil is used for gas making, the less will be the proportionate yield of tar and ammoniacial liquor. The prevention of the undue escape of noxious gases from sulphate of ammonia works was efficiently attended to last year, save in one instance, where repeated escape of sulphuretted hydrogen was observed. Proceedings for the enforcement of the provisions of the Acts were commenced; but they were not proceeded with beyond the initial stages. Subsequently, by due attention to the means at disposal, and the use of proper material in the purifier for absorbing the foul gases, no further occasion for complaint occurred. The prolonged coal strike in England, and the succeeding, but shorter, one in Scotland, curtailed for a time the production of pig iron and the subsidiary products extracted from the iron blast-furnace gases. In the shale works, the fight against low prices and foreign competition was still in progress at the time of the report. Three works of this kind ceased operations; but a new one was built and started during the year—the number on the register being thus reduced by two. The quantity of sulphate of ammonia produced from shale does not, however, show a corresponding reduction; sustained effort to effect improvements continuing to increase the proportion of products from the raw material worked upon. The use of the waste steam from the ammonia departments for assisting in the decomposition of the shale in the retorts has become general; and it at once effects an economy, and removes any source of annoyance in the production of the sulphate.

The Gravesend Corporation and the Water-Works.—"The fact that the resolution recently come to by the Gravesend Corporation to take steps to acquire the water-works, as reported in the JOURNAL last week, passed the Council with only one dissentient, must not be taken," writes a local correspondent, "as representing the comparative unanimity of the burgesses, who propose to call a meeting to discuss the matter from their point of view; it being a prevalent opinion that the Corporation have quite as many responsibilities in hand as they can satisfactorily carry out."

WATER-WORKS EXTENSIONS AT OLDHAM.

The New Reservoir at Rooden.

The inauguration of the Rooden Water Scheme of the Oldham Corporation took place on the 30th ult., by the cutting of the first sod of the new flood water reservoir to be constructed at Picthorne. When completed, the reservoir will be 18 acres in extent; and will be capable of containing 225 million gallons. Coupling this with the increased capacity at the Ogden reservoir in consequence of the recent extension—by which there is storeage for 78 million gallons more than previously—the town will have an additional daily supply of 750,000 gallons at a cost of 4d. per 1000 gallons. The amount expended on the Ogden extension, and the outlay that will be required on the making of the new reservoir, represent a total sum of £103,000. Flood water that now goes to waste will be stored in this reservoir; and it is estimated that, when available for its purpose, all the rainfall in the district will be impounded. The work will be completed in about four years; and the new reservoir will differ from any other reservoir of the Oldham Corporation in that it will have two embankments, because it is on the border of two drainage areas. It was arranged that Mr. Adam Lee, J.P., the Chairman of the Water-Works Committee, should cut the first sod. After Mr. G. H. Hill (the Water-Works Engineer) had pointed out the site and explained the plans of the proposed reservoir, water courses, &c., Mr. Lee said that the Rooden reservoir was the last of a series for which parliamentary powers were obtained by the Corporation in 1886; and it practically gave the Water Committee control of the whole of the water on their present gathering ground, or, at least, all the water which would go by gravitation to the town. Oldham depended absolutely for its water supply upon the rain which fell from heaven, because it was situated on the top of a hill, and had no river or other waterway. This emphasized in his mind the great necessity for ample storeage accommodation. During the drought of last summer, when many neighbouring towns were complaining of scarcity of water and were reducing their consumption for both domestic and trade purposes, Oldham, notwithstanding its natural disadvantages, had plenty for all its requirements. This happy condition was due particularly to the fact that they had had a succession of far-seeing men in connection with the Water Department, who had sought to provide the town with an abundant and pure supply. The present members of the Committee were as anxious in this respect as ever their predecessors were; and he thought it was no exaggeration to say that the supply that day was purer, more abundant, and better all round than ever it had been. In the name of the Mayor, aldermen, and burgesses of Oldham, he cut the first sod—doing so in the hope that the work thus formally begun might be continued and ended without loss of life. Mr. Lee then cut the first sod, which was put in a barrow and wheeled off by Mr. Dodd, the Vice-Chairman of the Water Committee. At the luncheon that followed, Mr. S. Buckley proposed "Success to the Undertaking." He referred to the fact that they had never had a mishap in the execution of work in connection with Oldham's water supply; and expressed the hope that the reservoir of which the first sod had been cut that day would be completed without any serious accident. The name of Mr. Dodd was associated with the toast; and in reply he said he did not think the toast was very necessary, for they had no fear that the success of the undertaking would not be complete, because in the first place they had got one of the first men in Great Britain as Engineer, and because they had also got in their Manager, Mr. Watts, a tried and talented servant, and an able assistant Manager in his son. As the works proceeded, there was not the slightest doubt but that there would be accidents; and he trusted that the Committee would take care to insure every workman they engaged. Alderman Emmott, in proposing Mr. Hill's health, referred to his grandfather's connection with water-works engineering in the neighbourhood. Mr. Hill, in acknowledging the compliment, said there was scarcely a water-works system in the country as good as that of Oldham; and he was perfectly satisfied that they would do good work at Rooden.

The Danger of Loose Gas-Taps.—An inquest was held at Primrose Hill, near Huddersfield, last Wednesday week, touching the death of Mr. Timothy Thorpe (aged 75). It appeared that he went to bed on the previous Saturday evening apparently quite well. The following morning there was a strong smell of gas in the house; and as Mr. Thorpe had not been seen, Mrs. Scholes (with whom he lodged) went to his bedroom. On opening the door, she was nearly overpowered by gas, which she found had escaped from the gas-burner—the tap being turned on. Deceased was in bed, and had been very sick; and he remained apparently unconscious until his death. Mrs. Scholes did not think that he had purposely tried to suffocate himself, but that the tap (which was very loose) had been accidentally turned on. The medical evidence showed that the cause of death was poisoning by coal gas; and the jury returned a verdict in accordance therewith.

The Halifax Town Council and the Management of the Gas-Works.—The Halifax Corporation lately decided that no expenditure beyond £100 should be incurred by Committees without a special resolution of the Council. The inconvenience of being restricted to such a small amount has already been felt by the Gas Committee; and it necessitated the calling of a special meeting of the Council on the 10th inst. to consider a recommendation that 570 yards of gas-mains should be laid. The discussion on the matter was a short one; but in the course thereof, Alderman Whitaker took advantage of the opportunity it afforded him to have a fling at the management of the Gas Department. This, he asserted, was as bad as it could be, both on the part of the Committee and their Manager. He did not say this because he had received any personal injury; but from knowledge that had come to his ears, and from what he had seen, he had arrived at the conclusion that the Manager was not in his right place, and was not worth the money——. Whatever else the Alderman had intended to say was lost, by the Mayor asking members to confine themselves to the immediate subject; adding that the Gas Manager's character ought not to be brought before the Council in this sort of way. The resolution was adopted.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

Touching upon the death of Mr. D. B. Esplin, of Forfar (upon which I send a separate paragraph for another part of the JOURNAL), the Corporation met on Tuesday to consider the question of filling up the vacancy; and they resolved to advertise for candidates, offering £150 a year with free house, coal, and gas. There was some discussion before this was agreed to; certain members being of opinion that £130 was sufficient salary to begin with, for the reason—a singular one—that, if they held out a prospect of an increase, there would be an inducement to whoever was appointed to do his best. Against this there was urged, with more reason, that, unless they offered a fair salary, they might not get a satisfactory class of applicants. Provost Anderson was of opinion that they should try to get a man not more than about 35 years of age; and that now, when there was so much talk of making gas from oil, and of electric lighting, the man appointed should be one of some standing in his profession. I should say that the proviso as to age was scarcely necessary, because if they are to appoint a man of standing, he is almost certain, if qualification is looked to, to be a young man. There has been such an advance in recent years, in the matter of training, that the men who have recently come into the gas making profession are head and shoulders, in all theoretical matters, over those who went before. In practice, of course, many of the older men can quite hold their own; and as it is practice which is the test of a gas manager, I think it is a pity a line should be drawn which would exclude some good men from applying. The resolution to appoint a man of standing is a good one, not so much for the community as for the man himself. Whoever gets the appointment must take up his position, and not be swayed by a section of the Corporation, who have not been over-pleasant to Mr. Esplin. I hope they will get a man of such ability that, whatever he says, none of them will be able to gainsay it.

The Port-Glasgow Corporation gas undertaking is flourishing. On Monday night, Bailie Macfarlane stated that they had resolved to have one of the gasholders, which was very much out of repair, replaced by a new one, and that the contract had been let to Messrs. Hanna, Donald, and Wilson, of Paisley. During the past year, he said, the working of the gas-works had been more successful than they had anticipated; and if they were to keep up the supply of gas to the community, they must maintain their plant in order.

In the Brechin Town Council, there are some people who have curious notions of business. There is a roughness between them and the Gas Company over the question of who is liable for the repair of damage which was done by a thunder-shower about this time last year; and some of the councillors seem to think that petty annoyance of the Company will serve the ends of the town. Whether their policy be right or not, is of no consequence here; but it is quite different from a proposal which came up at last Monday's meeting of the Council with reference to the price of gas supplied to the public lamps. In May last, one of their number called attention to the charge of 4s. 7d. per 1000 cubic feet; and although it was pointed out that in 1858 an agreement was entered into under which the Company were not to charge more than 4s. 10d., and were to have the privilege of opening up the streets, a Committee was appointed to consider the subject. This Committee, which adopted the high-sounding name of the Special Gas Charges Committee, reported on Monday. All that they seemed to have done was to consider the Company's account for the year to May 31 last; and their recommendation was that they should pay the Company at the rate of 4s. 2d. per 1000 cubic feet in full discharge of their account, and should enter into an agreement that, if the Company would give the town an abatement of 15 per cent. upon the price paid by ordinary consumers, they might have the privilege of opening up the streets for the purpose of laying and repairing mains and service-pipes, if due notice were given to the Burgh Surveyor. Now the fact that gas was supplied to the public lamps under agreement did not seem to be of any consequence to the Council; for they adopted the recommendation of the Committee. Later in the sitting, however, it appeared to have occurred to them that the Company might be dealt with in future, by agreement, but that debts already incurred to them must be met; and they accordingly rescinded their resolution, and agreed to pay the account as rendered. Whether the other recommendations stand, I do not know; but, of course, any resolution which the Council may adopt, can have no force until it is agreed to by the Company.

At a meeting of Glasgow Police Commissioners on Monday, when the police accounts for the past year were under consideration, Bailie Chisholm called attention to an item of £23,614 which was paid for the lighting of the common stairs in the city, and said that as the Commission only recovered, of that sum, £14,456 from the owners of property, the ratepayers were paying £9158 into the pockets of landlords for the lighting of their property. Mr. Crawford, in reply, said that a Committee were considering the subject, among other items, relating to the readjustment of taxation as between landlord and tenant. Now the Glasgow method of providing for the lighting and extinguishing of lights on common stairs—the Corporation doing the work and charging owners for it—has frequently been lauded, and is being adopted in Edinburgh. I have, however, never approved of it, because of the unfair principle in it, which throws a burden upon the person who does not reside in a dwelling entering by a common stair to light the premises of those who do. Common stairs are private property, and should be lighted either by those who own, or by those who reside in them. How would the question be looked at if it were proposed to make a contribution out of the rates of more than one-third of the cost of lighting the railway stations in Glasgow? Yet the one would be as reasonable as the other.

Arbroath is threatened by the Northern Electric Supply Company, who have given notice that they propose to apply for a Provisional Order to enable them to supply electricity in the burgh. The subject was considered by the Committee of Management of the Gas Corporation on Wednesday night; and they resolved to oppose the application, as they are themselves prepared to apply for a Provisional Order whenever it was generally demanded by the community. The Committee also agreed that the intimation given by the Electric Company was defective in respect that it had not been given to the body who was the Local Authority under the Electric Lighting Act. They were agreed that the Gas Corporation was the Local Authority under the Electric Lighting Act; whereas the intimation was sent to the Town Council. This is a very brave resolution on the part of the Gas Committee. It is doubtful, however, if they would be able to satisfy the Board of Trade that their intention to go on with an installation themselves is sufficiently strong to warrant the Board in preventing a Company, who are prepared to proceed with the work at once, from having the opportunity.

Electric lighting was also before the Stirling Town Council this week; and its treatment is a good illustration of the attitude of communities towards the electric light. The Council are under obligation to proceed with an application for a Provisional Order this autumn; but, lest they should forget their obligation, the Scottish House-to-House and the Caledonian Electric Supply Companies have notified them that they intend to apply for Provisional Orders on their own behalf. The Council are not to be allowed to shuffle out of the matter. When the subject came up this week, all they could do was to resolve to proceed. But (and here comes in the instructive part of the business) they resolved, while making the whole burgh the area of supply, to make the compulsory area very small, so that they would have little outlay—that is to say, they are going into the matter not because they wish to, but because it is being forced upon them. How different this is from the glowing speeches of the advocates of electric lighting. There was a feeling in the Council that the matter should not be hurried, but that inquiries should be made as to how electric lighting was doing in other places; and this suggestion was adopted. The policy is evidently to get another year's delay.

The Scotch coal strike is just concluding its eighth week. When I wrote last week, there was a difference both among the masters and the men. Since then, an attempt has been made to heal the division between the masters by agreement; and it is likely to be all but successful. There is one master, however, who does not seem to favour binding himself by agreement; for he has gone to the nominal head of the miners, and has offered to give his men the 1s. per day which is asked, and to guarantee it for two years. Of course, this man simply wants to get his pit opened before others, while the high prices are ruling. Instead of accepting the offer, the miners' leader is denouncing the offerer, at which there are to be heard expressions of wonder and disapproval. I consider, however, that it showed good generalship on his part, because, had he allowed one owner to open his pits, other small masters would have followed suit; and the complete blockade which has been maintained, and which is the most powerful weapon the men can use, would have been at an end. Then there would have been great risk of the strike collapsing, not altogether favourably to the men; and those men who might go back to work without the 1s. would have been discontented, while the master, or any others who might have guaranteed 1s. for a certain period, would have been at a great disadvantage. It is therefore better, for both sides, that things should remain as they are until all get corresponding, not necessarily the same, terms. As regards the difference among the men's leaders, it too seems in a fair way of being healed. The important step was taken this week of holding a conference of the Federation, at which a vote was taken upon the question of whether the men should accept the partial settlement of a restoration of 6d. per day to their wages, or whether they should adhere to their original resolution to demand 1s. The latter was carried by 60 votes to 26. Since then the leaders who were favourable to the partial settlement have dropped it, and are supporting the policy of the majority. This has the appearance of giving a new lease of life to the strike; but it may be otherwise. The question of how long the leaders can keep the men out is becoming more pressing day by day. Strike pay, which is to be paid at the close of next week, is expected to be smaller than before. Much, of course, depends upon the amount sent from England; and if it shows the decline which it has manifested at every one of the periods of distribution hitherto, the men cannot be expected to hold out long. The sympathy of the community too is manifestly not with the men. Worse than all, for them, is the fact that numbers of men, increasing day by day, are returning to work, despite picketing.

Notices of Accidents Act.—Early in the session, a Bill was introduced by the Government for "providing for notice of, and inquiry into, accidents occurring in certain employments and industries." The Bill has lately received the Royal Assent; and the Board of Trade have issued a circular directing attention to its provisions. Where there occurs in any employment specified in the schedule to the Act any accident which causes to any person employed therein either loss of life or such bodily injury as to prevent him, on any one of the three working days next after the occurrence of the accident, from being employed for five hours on his ordinary work, his employer shall, as soon as possible, and, in case of an accident not resulting in death, not later than six days after the occurrence of the accident, send to the Board of Trade notice in writing of the accident; specifying the time and place of its occurrence, its probable cause, the name and residence of any person killed or injured, the work on which any such person was employed at the time of the accident, and, in the case of an injury, the nature of the injury. If any person wilfully makes default in complying with these requirements of the Act, he is liable, on summary conviction, to a fine of 40s. Power is also conferred upon the Board of Trade to hold formal investigations in cases of serious accidents. The following is a copy of the schedule to the Act: "(1) Construction, use, working, or repair of any railway, tramroad, tramway, gas-works, canal, bridge, tunnel, harbour, dock, port, pier, quay, or other work authorized by any local or personal Act of Parliament; (2) construction or repair, by means of a scaffolding, of any building which exceeds 30 feet in height, or use or working of any such building in which more than 20 persons, not being domestic servants, are employed for wages; (3) use or working of any traction engine or other engine or machine worked by steam in the open air." Copies of this circular will be furnished to those employers in the scheduled trades who care to apply for them at the Board of Trade, Whitehall Gardens, S.W.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Aug.* 18.

Sulphate of Ammonia.—There is as yet no change, though the demand is not inactive. Circumstances generally do not contribute towards stimulating the latent factors into life; and the position remains unchanged. There are the facts of buyers allowing their contractors to postpone deliveries; of speculators promulgating unfavourable reports; of consumers putting off buying in consequence; and last, but not least, the passing of an American Tariff Bill, which is far from propitious to an increased consumption in that country. Now, in the ordinary course of events, a combination of such disparaging influences would have tended towards a sharp decline in values; and does not the reality—*i.e.*, the maintained steadiness of prices—amply corroborate the repeated arguments in these columns as to the soundness of the position and the possibilities of a rally? The stocks throughout the kingdom are not large, and, of course, cannot possibly show any increase for some weeks to come, be the demand whatever it may. Slightly easier quotations are generally made; and about £13 12s. 6d. seems to-day's current value. Nitrate is a little firmer; 9s. per cwt. being quoted.

LONDON, *Aug.* 18.

Tar Products.—The chief feature of this market during the past week is the high price paid for pitch for prompt delivery. There being a scarcity at the moment in the supply for forward delivery, the price is much lower. Considerable business in benzol has been done at 10½d. for 90's and 1s. for 50's. These unprecedented low prices should open up new outlets—at all events, they represent anilines at a rate which should largely increase their consumption for dyeing purposes. Indeed, at a parity price, aniline should be as cheap even as logwood for dyeing blacks, to say nothing of the great superiority of the colour produced by it over its natural competitor. Singularly, carbolic acid, although inquired for, does not improve in value. It is thought, however, that the demand for picric acid for explosive purposes is likely to have an important influence on the value of carbolic acid shortly. Other products are neglected; and pyridine seems to be unsaleable. The following prices were noted during the week: Tar, 15s. to 19s. Pitch, spot, 35s.; forward, 31s. to 32s. Benzols, 90's, 10½d.; 50's, 1s. Solvent naphtha, 1s. 3d. Creosote liquid, 2½d.; ordinary, 2d. Creosote salts, 20s. Cresylic acid, 1s. Crude benzol naphtha, 30 per cent., 5d. Carbolic acid, 1s. 7d. Anthracene, "A," 1s. 1d.; "B," 10d.

Sulphate of Ammonia.—Buyers holding off for lower prices have made this market dull. The little business that has been transacted has ranged from £13 10s. to £13 15s., less 3½ per cent. Gas liquor is quoted at 10s. to 11s. 6d. per ton.

COAL TRADE REPORTS.

From Our Own Correspondents.

Lancashire Coal Trade.—The position throughout this district continues extremely unsatisfactory; and but for the extra demand which comes forward for the supply of requirements in Scotland, owing to the continued strike of miners against a reduction of wages, local collieries would find the greatest difficulty in moving away half their ordinary output. As it is, pits only in exceptional cases are working a full average of four days per week; and stocks go on accumulating. The local and inland demand for all descriptions of round coal is exceptionally slow; and there is so much cutting in the open market to get hold of orders, that prices are very irregular. In the Manchester district, where the leading firms are now issuing reduced lists, there has practically been a more or less general reduction of something like 5d. per ton; and in other districts it is exceptional where collieries are holding to what may be termed their list rates. The better qualities of round coal are only in the most limited request. It is only in special cases that more than 11s. is to be had for best Wigan Arley; 10s. for Pemberton four-feet and seconds Arley; and about 8s. for common house-fire qualities. The lower descriptions of round coal continue in very indifferent demand for ironmaking, steam, and general manufacturing purposes; but some fairly large quantities have been disposed of to the railway companies in Scotland for locomotive purposes. No very appreciable advance has been obtainable, however, on what may be regarded as current rates, which range from 7s. to 7s. 6d. per ton at the pit mouth—the last-named figure being about the average that is being paid by Scotch railway companies to obtain supplies. Engine classes of fuel continue plentiful, although not quite so much a drug upon the market as they have been recently. At the pit mouth, common slack averages about 3s. 9d. to 4s.; better qualities, 4s. 6d. to 5s.; with the best descriptions quoted about 5s. 6d. to 6s. per ton. For shipment, there is a fairly active business doing; but this is largely in cargoes for Scotland—both in round coal and engine fuel—with prices delivered at the ports on the Mersey averaging about 8s. 9d. to 9s. for common round coals, and about 5s. 6d. to 5s. 9d. for engine fuel.

Northern Coal Trade.—The demand for coal in the north-eastern district has improved of late. There are very full shipments; whilst there is now a fuller inland consumption, and there continues a demand also from Scotland. The strike there seems likely to endure longer than some had supposed to be probable. Best Northumbrian steam coals are still very freely exported, especially to the Baltic ports; and thus, with full work and a large production, the price is maintained at the high level of 11s. per ton, f.o.b. Second-class steam coals are quoted at about 10s. per ton, f.o.b.; and small steam from 4s. 9d. to 5s. per ton. Bunker coals, however, are still very plentiful; and the price is in consequence weak—so many of the steamships being laid idle through the low freights. For unscreened bunker coals, the general quotation is 7s. per ton, f.o.b., whilst best screened Durham kinds are quoted as high as 8s. 6d. to 8s. 9d. per ton. Manufacturing coals are steady in price; the local demand being lessened by the effect of strikes in several industries. There is a large demand for this class from Scotland, which sustains the price and keeps down the stocks that would otherwise accumulate rapidly. In regard to gas coals, the chief feature is the general enlargement of the demand as the days shorten. There is a fair sale for gas coals; but the supply is adequate, and the price shows no general alteration. One or two collieries, however, which are very favourably situated, have raised their quotations. From 7s. 3d. to 7s. 9d. per ton, f.o.b., is the usual price for best Durham gas coals; and the demand is now fairly good. The companies are laying in stock in earnest; and the low rate of steamship freights encourages this proceeding. One or two contracts for gas coal for Scotland have been entered into; but they are for immediate delivery, and at about the current price. The only effect therefore is, to give fuller time at some of the Durham pits than would otherwise have been the case. In regard to coke, there is a fair local demand for best blast furnace kinds; but the export enquiry is still disappointing. For shipment, the price varies from 13s. 6d. to 15s. per ton, f.o.b. Gas coke is in a little larger supply just now; but there is no great movement in price this week.

Scotch Coal Trade.—Trade, necessarily, is not improving. There is still a considerable quantity of coal in stock; though, of course, it is rapidly disappearing. What there is yet to sell is fetching higher prices—having risen this week, for Scotch coal, from 16s. to 17s., delivered in Glasgow, to from 17s. to 18s.; and for English coal, from 15s. to 16s. to from 16s. to 17s. Lancashire slack can be had at from 10s. 6d. to 11s. per ton. Large quantities of English and Welsh coal are coming in, and meeting with a ready sale. The rise for English coal is due to increased freights; and this again has been brought about by the difficulty in getting return cargoes. The export trade is in a lamentable condition. For the week, shipments only amounted to 9999 tons—a decrease, as compared with the preceding week, of 14,072 tons; and, as compared with the corresponding week of last year, of 149,074 tons. For the year to date, the total shipments have been 3,729,124 tons—a decrease, as compared with the same period of last year, of 492,189 tons; and, as compared with the same period in 1892, of 807,863 tons.

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

(For Stock Market Intelligence, see ante, p. 363.)

Issue.	Share	When ex-Dividend	Dividend or Div. & Bonus.	NAME.	Paid per Share	Closing Prices.	Rise or Fall in Wk.	Yield upon investment.
£			p. c.	GAS COMPANIES.				£ s. d.
590,000	10	12 Apl.	10½	Alliance & Dublin 10 p. c.	10	18½—19½	+½	5 7 8
100,000	10	,,	7½	Do. 7 p.c.	10	13—14	+½	5 7 2
300,000	100	2 July	5	Australian (Sydney) 5 % Deb.	100	105—107	..	4 13 4
100,000	20	14 June	8	Bahia, Limited	20	9½—10½	..	15 3 10
200,000	5	11 May	6½	Bombay, Limited	5	5¼—5½	..	5 13 0
40,000	5	,,	6½	Do. New	4	4—4½	..	5 15 6
380,000	Stck.	15 Aug.	11½	Brentford Consolidated	100	222—227*	+¼	5 1 4
180,000	,,	,,	8½	Do. New	100	172—177*	+1¼	4 16 1
220,000	Stck.	15 Mar.	11½	Brighton & Hove Original	100	210—215	..	5 6 11
888,500	Stck.	28 Feb.	5	Bristol	100	113—116	..	4 6 2
320,000	20	29 Mar.	11½	British	20	47½—48½	..	4 12 9
50,000	10	28 Feb.	11½	Bromley, Ordinary 10 p. c.	10	21½—22½	..	5 2 2
51,510	10	,,	8½	Do. 7 p. c.	10	16½—17½	..	4 17 2
328,750	10	28 June	2	Buenos Ayres (New) Limited	10	5¼—5¾	..	3 9 7
200,000	100	2 July	6	Do. 6 p. c. Deb.	100	99—101	..	5 18 10
150,000	20	12 July	8	Cagliari, Limited	20	25½—26½	..	6 0 8
550,000	Stck.	12 Apl.	12½	Commercial, Old Stock	100	265—270	..	4 12 7
165,000	,,	,,	9½	Do. New do.	100	195—200	..	4 15 0
160,762	,,	14 June	4½	Do. 4½ p c. Deb. do.	100	132—137	..	3 5 8
800,000	Stck.	14 June	13	Continental Union Limited	100	239—244	+2	5 6 7
200,000	,,	,,	10	Do. 7 p. c. Pref.	100	210—215	..	4 13 0
535,000	Stck.	28 Feb.	5	Crystal Palace Ord. 5 p.c. Stk	100	107—112	..	4 9 2
486,090	10	27 July	11	European, Limited	10	23—24	..	4 11 8
354,060	10	,,	11	Do. Partly paid	7½	16—17	..	4 17 1
5,646,590	Stck.	15 Aug	12	Gaslight & Coke, A, Ordinary	100	245-250*	+1	4 16 0
100,000	,,	,,	4	Do. B, 4 p. c. max.	100	100-104*	+2	3 16 11
665,000	,,	,,	10	Do. C, D, & E, 10 p.c. Pf.	100	271-276*	+1	3 12 6
30,000	,,	,,	5	Do. F, 5 p. c. Prf.	100	130-135*	+2½	3 14 1
60,000	,,	,,	7½	Do. G, 7½ p. c. do.	100	192-197*	+4½	3 16 1
1,300,000	,,	,,	7	Do. H, 7 p. c. max	100	177-182*	+2	3 16 11
463,000	,,	,,	10	Do. J, 10 p. c. Prf.	100	270-275*	+1	3 12 9
476,000	,,	,,	6	Do. K, 6 p. c. Prf.	100	165-170*	+1	3 10 7
1,061,150	,,	14 June	4	Do. 4 p. c. Deb. Stk.	100	127—130	..	3 1 6
294,850	,,	,,	4½	Do. 4½ p. c. do.	100	132—137	..	3 5 8
908,000	,,	,,	6	Do. 6 p. c. do	100	175—180	..	3 6 8
3,800,000	Stck.	11 May	12	Imperial Continental	100	225—230	+2	5 4 4
75,000	5	14 June	6	Malta & Mediterranean, Ltd.	5	4¾—5¼	..	5 14 3
560,000	100	2 Apl.	5	Met. of Melbourne, 5 p. c. Deb.	100	109—111	..	4 10 1
541,920	20	14 June	5	Monte Video, Limited	20	14½—15½	..	6 9 0
150,000	5	30 May	8	Oriental, Limited	5	6½—6¾	..	5 18 6
60,000	5	29 Mar.	7	Ottoman, Limited	5	3½—4¼	..	7 7 4
166,870	10	31 Jan.	2	Pará Limited	10	1½—2	..	10 0 0
420,000	100	2 May	6	People's Gas of Chicago— 1st Mtg. Bds.	100	102—107	..	5 12 1
500,000	100	1 June	6	2nd Do.	100	95—100	..	6 0 0
150,000	10	26 Apl.	6	San Paulo, Limited	10	9—10	..	6 0 0
500,000	Stck.	28 Feb.	15½	South Metropolitan, A Stock	100	325—330	+2	4 14 1
1,350,000	,,	,,	12	Do. B do.	100	275—280	+3	4 5 8
260,000	,,	,,	13	Do. C do.	100	287—292	+7	4 9 0
750,000	,,	12 July	5	Do. 5 p. c. Deb. Stk.	100	155—160	..	3 2 6
60,000	Stck.	28 Feb.	11½	Tottenham & Edm'nton, "A"	100	215—220	..	5 4 7
				WATER COMPANIES.				
746,011	Stck.	28 June	10	Chelsea, Ordinary	100	283—288	..	3 9 5
1,720,252	Stck.	12 Apl.	8	East London, Ordinary	100	228—233	..	3 8 9
544,440	,,	28 June	4½	Do. 4½ p. c. Deb. Stk.	100	147—152	..	2 19 2
700,000	50	14 June	8½	Grand Junction	50	119—123	..	3 9 1
708,000	Stck.	15 Aug.	12	Kent	100	300-305*	+4	3 18 8
1,043,800	100	28 June	9½	Lambeth, 10 p. c. max.	100	238—263	..	3 12 3
406,200	100	,,	7½	Do. 7½ p. c. max.	100	207—210	..	3 11 5
330,000	Stck.	29 Mar.	4	Do. 4 p. c. Deb. Stk.	100	132—135	..	2 19 3
500,000	100	15 Aug.	12½	New River, New Shares	100	377-382*	+3	3 3 6
1,000,000	Stck.	27 July	4	Do. 4 p. c. Deb. Stk	100	134—137	..	2 18 4
902,300	Stck.	14 June	6	S'thwk & V'xhall, 10 p. c. max.	100	168—173	..	3 9 4
126,500	100	,,	6	Do. D 7½ p. c. do.	100	149—152	..	3 19 0
1,155,066	Stck.	14 June	10	West Middlesex	100	273—278	..	3 12 0

*Ex div.

Leeds Corporation Gas Affairs.—Last Thursday, the Gas Committee of the Leeds Corporation agreed to accept tenders for the supply of 135,000 tons of coal and 10,000 tons of cannel, at prices which are slightly in advance of those of last year. In addition, there are 100,000 tons of coal which the Committee resolved to purchase twelve months ago, but which was not delivered in consequence of the miners' strike; and this quantity the Committee anticipate they will take this year. A tender was also accepted for the purchase of the surplus tar produced at the New Wortley, Meadow Lane, and York Street Gas-Works for the next three years; the price being £1 per ton, which is a reduction on the last contract.

Reductions in the Price of Gas.—The Wakefield Gas Company announce that the current quarter's bills of the consumers are to be calculated on the basis of 2s. 8d. per 1000 cubic feet. This is a reduction of 2d., or half of the increase made at the beginning of the year.——The Directors of the Liverpool United Gas Company have decided to reduce the price of gas from 3s. 4d. to 3s. per 1000 cubic feet as from the end of last quarter.——The British Gaslight Company have given notice that the price of gas to private consumers in the Potteries district will be reduced from 2s. 9d. to 2s. 6d. per 1000 cubic feet from the 1st ult.; and that the charge for public lighting will be lowered to £2 15s. per lamp per annum—a decrease of 5s.

A New Reservoir for Stratford-on-Avon.—At the meeting of the Stratford-on-Avon Town Council last Tuesday, it was reported that satisfactory arrangements had been made with Lady Trevelyan's agent for the taking of surplus water from off the portion of the Welcombe Estate situated on the northern boundary of the present watershed, with the object of augmenting the existing supply. It was resolved to proceed with the construction of a covered service reservoir to contain 125,000 gallons, and a washed sand intercepting tank.

The Garden Allotments at the Newport (Mon.) Gas-Works.—The Chairman of the Newport (Mon.) Gas Company—Mr. E. J. Phillips, J.P.—recently distributed the prizes to the successful competitors in the cultivation of garden allotments at the Crindau works. A very satisfactory report was presented by Mr. Wattie, the judge; and, among other favourable remarks, he observed that the success of the cropping and cultivation was still more creditable to the workmen, as this year they had been tilling newly made ground, and the month of May had turned out very harsh. In presenting the prizes, Mr. Phillips accompanied them with a few genial words of encouragement. The Vice-Chairman (R. Laybourne, Esq., J.P., D.L.) said he was very pleased to have the opportunity of meeting the men, and of seeing all the gardens looking so well, and more especially the flower border—another proof that proximity to gas-works did not in any way injure vegetation.

GWYNNE & BEALE'S
PATENT GAS EXHAUSTERS AND ENGINES.

Telegrams: "GWYNNEGRAM, LONDON." Telephone No. 2698.

GWYNNE & CO.,
HYDRAULIC AND GAS ENGINEERS,
BROOKE STREET WORKS, HOLBORN, LONDON, E.C.
Late ESSEX STREET WORKS, VICTORIA EMBANKMENT, LONDON.

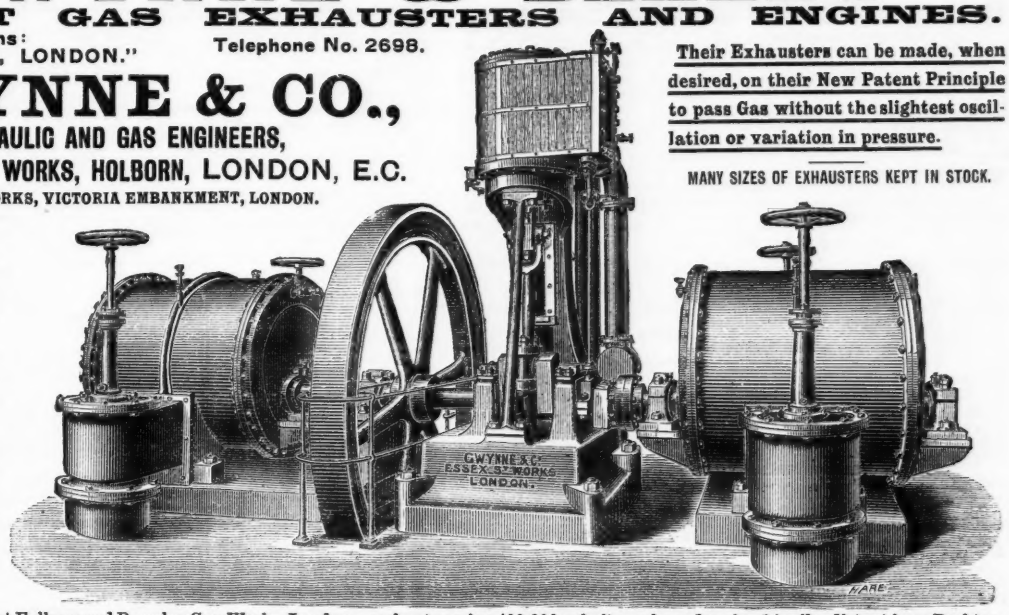
Their Exhausters can be made, when desired, on their New Patent Principle to pass Gas without the slightest oscillation or variation in pressure.

MANY SIZES OF EXHAUSTERS KEPT IN STOCK.

They have completed Exhausters to the extent of 32,000,000 cubic feet passed per hour, which are giving unqualified satisfaction in work.

Makers of GAS-VALVES, HYDRAULIC REGULATORS, VACUUM GOVERNORS, PATENT RETORT-LIDS, STEAM, PUMPS for Tar, Liquor, or Water; CENTRIFUGAL PUMPS and PUMPING ENGINES, specially adapted for Water-Works, raising Sewage, &c.

Also GIRARD and other TURBINES, HIGH SPEED ENGINES, DYNAMOS, &c., &c., for ELECTRIC LIGHTING.



Exhausting Machinery at Fulham and Bromley Gas-Works, London—each set passing 400,000 cub. ft. per hour drawing 14 miles distant from Beckton.

Catalogues and Testimonials sent on application.

NOTICE TO ADVERTISERS.—COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office *not later* than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or Stoppages of PERMANENT ADVERTISEMENTS should be received not later than the FIRST POST on SATURDAY.

OXIDE OF IRON.

O'NEILL'S Oxide has a larger annual sale in the United Kingdom than all other Oxides combined. Purity and uniformity of quality guaranteed. Pamphlet, "How to Purchase Bog Ore," to be obtained on application.
Gas Purification and Chemical Company, Limited, Palmerston Buildings, Old Broad Street, London, E.C.
JOHN WM. O'NEILL, Managing Director.

GAS PURIFICATION AND CHEMICAL COMPANY, LIMITED.

ANDREW STEPHENSON, Agent. All communications *re* OXIDE to be addressed to PALMERSTON BUILDINGS, E.C.

WINKELMANN'S "VOLCANIC" CEMENT. Fire Resistance up to 4500° Fahr. In use in most Continental Gas-Works, and in more than 900 British Gas-Works. [See Advt., p. 355.]
ANDREW STEPHENSON, 182, Gresham House, Old Broad Street, LONDON, E.C. Telegrams: "Volcanism, London."

AMMONIACAL LIQUOR Wanted.
BROTHERTON AND CO., Ammonia Distillers.
Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

GAS TAR Wanted.
BROTHERTON AND CO., Tar Distillers.
Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

SPENT OXIDE Wanted.
BROTHERTON AND CO., Chemical Manufacturers.
Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

BROTHERTON & CO.
Offices: Commercial Buildings, LEEDS.
Correspondence invited.

JAMES LAWRIE & Co. supply Best SCOTCH CANNEL COALS, Best FIRE-CLAY RETORTS, BRICKS, TILES, and LUMPS; BOILER SEATING BLOCKS, FLUE COVERS, and SILICA BRICKS for SPECIAL FURNACE WORK; COKE BARROWS, BOGIES, and SMALL WAGONS.
Postal Address: 1, WHITTINGTON AVENUE, E.C.
Telegram Address: "EIRWAL LONDON."

W. C. HOLMES & CO., Huddersfield; AND 80, CANNON STREET, LONDON,
Contractors for Gas-Works complete, Makers of Gasholders, Purifiers, Scrubbers, Condensers, Retort Fittings, &c., Improved Valves, Engines, and Exhausters. Also for Collingwood's Regenerative Retort-Settings.
*** See Advertisement p. III., centre of JOURNAL.
Cablegrams: "Ignitor London." Telegrams: "Holmes Huddersfield."

SPECIAL PAINT FOR GAS-WORKS.

JOHN E. WILLIAMS AND CO.,
VICTORIA PAINT WORKS, MANCHESTER.
Telegrams: "ENAMEL." National Telephone 1759.
GAS PLANT CEMENT
FOR ALL LEAKAGES.

J. & J. BRADDOCK, Globe Meter Works, Oldham.
First-Class Award, Melbourne Exhibition, 1889, for WET AND DRY GAS-METERS, STATION METERS, AND GOVERNORS, PRESSURE-GAUGES, STREET LAMPS AND PILLARS, &c.
Telegraphic Address: "Braddock Oldham."

SULPHURIC ACID.

JOHN NICHOLSON & SONS, Chemical Works, Leeds, specially produce this ACID from BRIMSTONE, for making SULPHATE OF AMMONIA of high quality and *good* colour. Delivery in our own Railway Tank-Wagons or Carboys. Highest references and all particulars supplied on application.

GAS PURIFICATION.

OXIDE OF IRON BOG ORE.

BALE & CO.'S Oxide of uniform quality Sample and Price on application.
OXIDE PAINTS, OILS, SULPHURIC ACID, &c.
120 and 121, NEWGATE STREET, LONDON, E.C.
Telegrams: "BOGORE, LONDON."

OXIDE OF IRON.

FINEST Quality of Natural Bog Ore. Particulars and price, apply to Mr. T. L. ARCHER, 20, Fennel Street, MANCHESTER.

PORTER & CO., Gowts Bridge Works, LINCOLN, Engineers, Ironfounders, and Contractors for the erection of Gas-Works for, Towns, Villages, Mansions, Manufactories, Collieries, and Isolated Buildings, at home and abroad. Manufacturers of Retorts and Fittings, Condensers, Scrubbers, Purifiers, Valves, &c.; also of Girders, Wrought and Cast Iron Tanks, Iron Roofs, &c.
Telegraphic Address: "PORTER LINCOLN."

PATENTS FOR INVENTIONS.

J. C. CHAPMAN, M.I.M.E. and Fel. Chartered Inst. Patent Agents. ADVICE ON ALL MATTERS CONNECTED WITH ABOVE.
Information and Handbook on application.
70, CHANCERY LANE, LONDON, W.C.

REDHILL GAS-WORKS ASSESSMENT APPEAL

THE Report of the proceedings at the hearing of the APPEAL of the REDHILL GAS COMPANY against the RATING OF THEIR PROPERTY in Reigate and Nutfield which was published in the JOURNAL has been reprinted (by desire) in Pamphlet form; and copies can be obtained, on application to the PUBLISHER, *price 4d. each.*

HYDRATED OXIDE OF IRON.

PREPARED from pure Iron
Two or three times as rich as Bog Ore.
Strong action on Sulphuretted Hydrogen.
To be used alone, but will increase activity of other Oxides.
Less than half the price of Bog Ore.
Can be lent on hire.
Write for tabulated results.
READ HOLLIDAY AND SONS, LIMITED, HUDDERSFIELD.

SADLER AND CO., LIMITED,
MIDDLESBROUGH; ULVERSTON (BARROW); PORTSMOUTH; CARLTON; STOCKTON; 315, St. Vincent Street, GLASGOW; and 85, Water Street, NEW YORK. Tar Distillers, Manufacturers of all TAR PRODUCTS, ALIZARINE and other TAR COLOURS, BICHROMES, OXALIC ACID, ALKALIES, LIQUOR AMMONIA, AMMONIA SULPHATE, &c.
Head Office: MIDDLESBROUGH. Correspondence invited.

ALWAYS a Buyer of Spent Oxide, Tar, and AMMONIACAL LIQUOR.
Apply to J. HARDMAN, Milton, STAFFORDSHIRE.

RE THE MAURITIUS GAS COMPANY, LIMITED.
(IN LIQUIDATION).

THE Port Louis Gas-Works, Land, PLANT, BUILDINGS, MACHINERY, FIXTURES, ACCESSORIES, and STOCK TO BE SOLD BY TENDER, in One Lot, by order of the Liquidator.
Tenders will be opened in London on Oct. 10, 1894.
Particulars and Forms of Tender of the Hon. HENRI ADAM, Port Louis, MAURITIUS; of THOS. H. E. FOORD, Esq., Solicitor, 16, Philpot Lane, LONDON; or of Messrs. EASTMAN BROS., Auctioneers, 28, Bucklersbury, LONDON.

WANTED, a Situation as Working MANAGER. Good references. Holds Patent Right No. 14,490 for Mixture of Petroleum Oil and Coal Gas. No Royalty to pay. Twenty years' experience in Coal Gas, and eight years' experimenting in Oil Gas.
Apply, by letter, to No. 2421, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

TO GAS COMPANIES.

WANTED, by a Young Man (age 21) a SITUATION as ASSISTANT METER INSPECTOR. Used to Meter and Stove Fixing, and all Gas routine.
For references, apply, by letter, to No. 2419, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

ADVERTISER desires Engagement either as SECRETARY, ACCOUNTANT, or ASSISTANT MANAGER. Twelve years' experience in Gas-Works Management and Accounts, also Thirteen years' in Municipal Accountancy. First-class testimonials.
Address No. 2416, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

FOREMAN PATTERN MAKER.

A THOROUGHLY competent Man desires engagement as above. Has had extensive experience in modern Gas Plant and General Engineering. Good organizer, and used to the control of men. Now at liberty.
Address, with full particulars, No. 2418, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, for Tar and Ammonia Works in Scotland, a NIGHT FOREMAN. Must be steady, and have had experience in a similar Situation.
Address, with copies of Testimonials, and Salary expected, No. 2415, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

LUDLOW UNION GAS COMPANY.

WANTED, a Managing Foreman, under the supervision of the Directors, for the Gas-Works, Ludlow, Salop.
For Particulars apply to the SECRETARY, Ludlow Union Gas Company, 14, Broad Street, Ludlow, SALOP.
Aug. 7, 1894.

WANTED, a thoroughly competent WORKING FOREMAN, to superintend a small Gas-Works. Make about 50 million cubic feet. House, Coal, and Gas. To a Man who thoroughly understands his duties, this is a very favourable offer.
Apply, by letter, to No. 2420, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

COUNTY BOROUGH OF BURNLEY.

THE Gas Committee of the Corporation of Burnley require the Services of an ANALYTICAL CHEMIST at their Gas-Works.
Salary, £80 per annum.
Applications, stating age, qualifications, and references, to be sent to the undersigned, on or before the 28th inst.
JNO. P. LEATHER,
Gas-Works, Burnley,
Aug. 10, 1894.

MARKET HARBOROUGH GAS COMPANY.

THE Directors require the services, at once, of a practical WORKING MANAGER, who thoroughly understands the Manufacture, Purification, and Distribution of Coal Gas on modern principles, and the making of Sulphate of Ammonia; Pipe laying, Connections, and Meters included.
Salary £110 a year, with House, Garden, Coal, and Light.
Applications, with two Testimonials (copies), to be sent to Mr. John Smith, Chairman.
C. BURGOINE,
Secretary.
Aug. 14, 1894.

WANTED, a second-hand Station Meter passing 2400 to 3000 cubic feet per hour.
Send particulars to the SECRETARY, Gas Company, STORNOWAY.

WANTED, a good second-hand Station METER, to pass from 10,000 to 15,000 cubic feet of Gas per hour, with Valves complete.
Particulars to GEORGE LANE, Manager, Gas-Works, Aylesbury, BUCKS.

WANTED, a new or second-hand Ex-HAUSTER, with Engine combined, to pass 40,000 feet per day.
State lowest Price and full Particulars to CLAYTON, SON, AND CO., LIMITED, LEEDS.

CYANIDES.

WANTED, Particulars of manufacture from Gas Liquor and Spent Oxide. Communications treated confidential.
Mr. BROTHERTON, Commercial Buildings, LEEDS.

FOR SALE—Bound Volumes (not soiled, newly bound) of the JOURNAL OF GAS LIGHTING, Nos. 51 to 61 inclusive.
Cash offers to A. B., Mansion House Buildings, LONDON, E.C.

FOR SALE—Four Purifiers, 6 feet square each, two GIRDERS, with COLUMNS for carrying Lifting Apparatus, also DRY CENTRE-VALVE and CONNECTIONS, complete, to be sold cheap.
Apply to E. P., 22, Alwyne Road, Canonbury, LONDON, N.

BOROUGH OF WIDNES.

THE Corporation invite Tenders for the purchase of from 400 to 500 tons of GAS TAR from their Gas-Works for the Twelve Months ending the 30th of September, 1894.
Forms of Tender and Conditions of Contract may be obtained from Mr. Isaac Carr, Assoc.M.Inst.C.E., Gas-Works, Widnes.
Tenders, endorsed "Tar," to be delivered to the undersigned not later than the 3rd prox.
The highest or any tender not necessarily accepted.
H. S. OPPENHEIM,
Town Clerk.
Town Hall, Widnes,
Aug. 18, 1894.

GREAT WIGSTON GAS COMPANY.

TENDERS FOR COAL.

THE Directors invite Tenders for the supply of from 1000 to 2000 tons of Best Screened GAS COAL, delivered at the Railway Station, Wigston, for Twelve Months ending Aug. 31, 1895, in such quantities as the Manager shall from time to time order.
No special Form of Tender provided.
Tenders to be addressed to the Chairman not later than the 25th.
The Directors reserve to themselves the right to accept the lowest or any tender.
JOHN A. HARRIS,
Manager.

BOROUGH OF NELSON.
(GAS DEPARTMENT.)

TENDERS FOR TAR.

THE Gas Committee of the Nelson Cor-poration invite TENDERS for the surplus TAR produced at their Gas-Works for a period of Twelve Months.
Particulars and Form of Tender to be had from the Gas Manager, Mr. W. Foster.
Tenders, sealed, and endorsed "Tar," to be delivered to the undersigned before Twelve o'clock noon, on Thursday, the 30th day of August, 1894.
By order,
R. M. PRESCOTT,
Town Clerk.
Town Hall, Nelson,
Aug. 16, 1894.

SMETHWICK LOCAL BOARD GAS-WORKS.

TAR CONTRACT.

THE Gas Committee invite Tenders for the purchase of the surplus TAR produced at their Gas-Works, Rabone Lane, Smethwick, for a period of One, Two, or Three Years, commencing on the 1st of October next.
Tenders, addressed to the Chairman of the Gas Committee, and endorsed "Tender for Tar," to be delivered to the undersigned, at the Public Buildings, Smethwick, (where Conditions and Forms of Tender can be obtained), not later than the 30th inst.
The Committee do not bind themselves to accept the highest or any tender.
By order,
W. J. STURGES,
Secretary.
Gas Offices, Smethwick,
Aug. 13, 1894.

STOCKTON-ON-TEES CORPORATION.

TENDERS FOR GAS COAL.

THE Gas Committee of the above Cor-poration invite TENDERS for the supply, in whole or in part, of 30,000 tons of GAS COAL, for the Year ending Aug. 31, 1895.
Particulars and Form of Tender can be obtained on application to the undersigned at the Gas-Works.
Tenders, sealed, and endorsed "Tenders for Gas Coal," to be sent in not later than noon of the 29th day of August, 1894, addressed to M. B. Dodds, Esq., Town Clerk, Stockton-on-Tees.
The Gas Committee do not bind themselves to accept the lowest or any tender.
WILLIAM FORD,
Engineer and Manager.
Stockton-on-Tees,
Aug. 4, 1894.

RAMSGATE CORPORATION.
(GAS AND WATER DEPARTMENT.)

THE Gas and Water Committee invite TENDERS for the supply of about 110 tons of Best BRIMSTONE ACID (what is known as 80 per cent. Acid, with a Specific Gravity of 142° Twaddel), to be delivered, in equal Monthly quantities, between the 1st of September next and the 1st of September, 1895.
Tenders to be sent in, addressed to the Chairman of the Gas and Water Accounts Committee, on or before Noon, on Monday, Aug. 27, endorsed "Tender for Sulphuric Acid."
The Committee do not bind themselves to accept the lowest or any tender.
Full Particulars on application to
WILLIAM A. VALON,
Engineer.

BOROUGH OF ILKESTON.

TENDERS FOR GAS COAL.

THE Gas Committee of the above Cor-poration invite TENDERS for the supply, in whole or in part, of the GAS COAL required from the 1st day of September, 1894, to the 31st day of July, 1895.
Form of Tender can be obtained on application to Mr. F. C. Humphrys, Gas-Works, Ilkeston.
Tenders, sealed, and endorsed "Tender for Gas Coal," to be in the hands of the undersigned by Twelve at noon, on Wednesday, the 29th day of August, 1894.
The Gas Committee do not bind themselves to accept the lowest or any tender.
WRIGHT LISSETT,
Town Clerk.
Town Hall, Ilkeston,
Aug. 17, 1894.

ISLE OF THANET GAS COMPANY.

SULPHATE OF AMMONIA.

THE Directors of the above Company are prepared to receive TENDERS for from 20 to 25 tons of SULPHATE OF AMMONIA for delivery, f.o.b. or f.o.r. Margate, between the 1st and the 10th of September.
For Samples and Conditions of Sale and delivery, apply to the undersigned.
Tenders to be received not later than the 30th inst., addressed to the Chairman of the Company.
The Directors do not bind themselves to accept the highest or any tender.
By order,
H. H. JONES,
Manager and Acting Secretary.
Gas-Works, Margate,
Aug. 18, 1894.

COUNTY BOROUGH OF STOCKPORT.
(GAS DEPARTMENT.)

SULPHATE PLANT.

THE Gas Committee are prepared to receive TENDERS for the supply and erection complete of a SULPHATE PLANT at their Portwood Works.
Specifications and all Information can be obtained from the Engineer (Mr. S. Meunier), Millgate Works, Stockport.
Tenders, endorsed "Sulphate Plant," and addressed to the Chairman of the Gas Committee, must be sent in on or before the 8th day of September next.
Full detail Plans and Specification of the particular Plant tendered for, separately enclosed, and addressed to the Engineer, may be sent.
No tender will be accepted without satisfactory proof that the firm tendering pays the standard rate of wages and observes the standard number of hours.
The Committee do not bind themselves to accept the lowest or any tender.
By order,
WALTER HYDE,
Town Clerk.
Aug. 18, 1894.

BRENTFORD GAS COMPANY.

SALE BY TENDER OF £30,000 NEW STOCK, 1881.

IN Pursuance of the Brentford Gas Order, 1881, NOTICE IS HEREBY GIVEN, that it is the intention of the Directors of this Company to Sell BY TENDER £30,000 of NEW STOCK, 1881, of the Company, to be paid up in full on or before the 1st day of October next, such Stock being a portion of Additional Capital authorized to be raised by resolutions passed at an Ordinary Meeting of Proprietors, held on the 21st day of February, 1890, under the powers of the above-mentioned Order.
Particulars and Conditions of Tender may be obtained on application at this office; and sealed Tenders must be sent in not later than Twelve o'clock (Noon) on Monday, the 10th day of September next.
By order,
WM. CROXFORD,
Secretary.
Office, Brentford Gas Company, Brentford,
Aug. 10, 1894.

BRIGHTON & HOVE GENERAL GAS COMPANY.

TO THE PROPRIETORS.

NOTICE is Hereby Given, that the ORDINARY HALF-YEARLY GENERAL MEETING of the Proprietors of this Company will be held at WINCHESTER HOUSE, No. 50, OLD BROAD STREET, LONDON, on Friday, the 14th of September, 1894, at Two o'clock in the afternoon precisely, to receive the Report of the Directors and the Accounts of the Company for the Half Year ended the 30th of June, 1894, to declare Dividends, to elect a Director in the place of the late Mr. George Edward Forrest, to elect Auditors (one in the room of Mr. Robert Hesketh Jones resigned), and for other purposes.
The Transfer Books of the Company will be closed from the 1st of September to the 14th of September, both days inclusive.
By order,
W. H. HARDY,
Secretary.
5, Great Winchester Street,
London, E.C., Aug. 16, 1894.

BROMLEY GAS CONSUMERS' COMPANY.

NOTICE is Hereby Given, that the OrdiNARY HALF-YEARLY GENERAL MEETING of this Company will be held at the Bell Hotel, Bromley, Kent, on Wednesday, the 22nd day of August inst., at Six o'clock precisely, to receive the Report of the Directors and the Balance-Sheet confirmed by the Auditors, to Declare Dividends, to Elect an Auditor, and for General Business.

The Transfer Books will be closed from the 10th to the 22nd of August, 1894, both days inclusive.

By order of the Board,
HENRY W. AMOS,
Secretary.

Offices at the Works, Bromley, Kent,
Aug. 10, 1894.

TOTTENHAM AND EDMONTON GASLIGHT AND COKE COMPANY.

NOTICE is Hereby Given, that the ANNUAL ORDINARY GENERAL MEETING of the Proprietors in this Company will be held at the Offices, Willoughby Lane, Tottenham, on Saturday, the 25th day of August inst., at Half-Past Three o'clock in the Afternoon precisely, to receive the Report of the Directors and Statement of Accounts for the Half Year ended June 30 last, to Declare a Dividend, for the election of two Directors and an Auditor for the ensuing Year, and for transacting General Business.

The Transfer Books for Consolidated Stocks will be closed from the 10th to the 27th inst., both days inclusive.

By order of the Board,
JAMES RANDALL,
Secretary.

Offices of the Company: Willoughby Lane,
Tottenham, Aug. 10, 1894.

MICHAEL AND WILL ON GAS AND WATER.

On the 17th of September will be ready, in One Volume, Royal 8vo., 32s. cloth,

The Law of Gas, Water, & Electric Lighting.

New Edition.

Re-written and brought down to date by
J. SHIRESS WILL, Q.C.

London: BUTTERWORTHS, 7, FLEET STREET. (Her Majesty's Law Publishers.)

HOLMSIDE GAS COALS.
(Wrought out of Holmside and South Moor Collieries.)

PRESENT production 4000 tons per working day. Area of coal about 5000 acres, including the largest remaining workable proportion of pure HUTTON SEAM GAS COAL. Analysis of HOLMSIDE GAS COAL *in bulk as shipped* gives 10,500 cubic feet of Gas per ton, of an Illuminating Power of 16¼ candles. The Sulphur is about 1 per cent., and the Ash 1¾ per cent. The Coal cokes well, and leaves about 70 per cent. of excellent Coke. To show the progress of HOLMSIDE COALS, it may be mentioned that the quantity carbonized by the London Gas Companies in 1885 was about 200,000 tons; whereas the present consumption of HOLMSIDE COALS in London alone is at the rate of nearly

600,000 Tons per Annum.

Full particulars on application to

MR. MARK ARCHER,
HOLMSIDE AND SOUTH MOOR OFFICES,
NEWCASTLE-ON-TYNE.

JAMES OAKES & Co.,
ALFRETON IRON-WORKS, DERBYSHIRE,
AND
Wenlock Iron Wharf, 21 & 22, Wharf Road,
CITY ROAD, LONDON, N.,

Manufacture and keep in Stock at their Works (also large stock in London)

PIPES and CONNECTIONS, 1½ to 48 inches in diameter, and make and erect to order RETORTS, PURIFIERS and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.

NOTE.—Makers of HORSLEY'S PATENT SYPHONS. These are cast in one piece, without Chaplets; doing away with bolts, nuts and covers, and rendering leakage impossible.

UNEQUALLED.

Gas Companies are solicited to try Samples of the

MIRFIELD
BLACK BED GAS COAL.

Prices and Analysis on application.

MIRFIELD (GAS-COAL) COLLIERY COMPY.
RAVENSTHORPE, NEAR DEWSBURY.

NEWBATTLE CANNEL.

Highest Results in Gas, & Excellent Coke.

QUOTATIONS ON APPLICATION TO

THE LOTHIAN COAL COMPANY,
LIMITED,
NEWBATTLE COLLIERIES,
DALKEITH, N.B.

HUNTER'S
OXIDE OF IRON.

JAMES HUNTER, LESSEE, MINER, AND SHIPPER OF
NATURAL IRISH BOG ORE.

This Estate yields the finest and most uniform quality in Ireland; and the quality is guaranteed.

Samples and Prices on application.

11, BAY STREET, PORT GLASGOW.
Telegrams: "HUNTER, PORT GLASGOW."
Established 1872.

LOW MOOR BLACK BED
GAS COAL.

YIELD OF GAS PER TON	10,375 CUBIC FEET.
ILLUMINATING POWER	17·50 SPERM CANDLES.
COKE	75 PER CENT.

Prices, f.o.r. or f.o.b., on application to

GEORGE & JOHN HAIGH,
RAVENS LODGE AND CONYERS' COLLIERIES,
DEWSBURY.

A TRIAL IS RESPECTFULLY SOLICITED.

THOMAS TURTON
AND SONS, LIMITED,
SHEAF WORKS, SHEFFIELD,
MANUFACTURERS OF
FILES OF BEST QUALITY
FOR ENGINEERS.
STEEL OF ALL DESCRIPTIONS.
SCREW STOCKS, TAPS AND DIES,
SPANNERS, RATCHET BRACES, LIFTING JACKS,
ANVILS, VICES,
AND ENGINEERS TOOLS GENERALLY.
London Office:
90, CANNON STREET, E.C.

BOLDON GAS COALS.

Worked by THE HARTON COAL CO., LTD.

Output about 3000 tons per day.

ANALYSIS—

Yield of Gas per ton	10,500	Cubic Feet.
Illuminating Power	16·9	Candles.
Coke	66·7	Coke.
Sulphur	0·86	Sulphur.
Ash	2·04	Ash.

Boldon Gas Coals are supplied under contract to

The Gaslight and Coke Company, South Metropolitan Gas Company, Commercial Gas Company, Imperial Continental Gas Association, European Gas Company, L'Union des Gaz (the Continental Union Gas Company), Crystal Palace District Gas Company, Bombay Gas Company, Ipswich Gaslight Company, Devonport Gas Company, Sunderland Gas Company, South Shields Gas Company, and to many other Companies at Home and Abroad.

For prices, &c., apply to the

HARTON COAL COMPANY,
LIMITED,
Newcastle-on-Tyne.
W. H. PARKINSON,
FITTER.

ROBERT MARSHALL,
CANNEL COAL MERCHANT,
97, WELLINGTON STREET, GLASGOW.

Prices and Analysis of all the Scotch Cannels on Application.

LONDONDERRY GAS COALS

FROM THE

MARQUIS OF LONDONDERRY'S COLLIERIES,
COUNTY OF DURHAM.

Available output up to 5000 tons per day. Yield of Gas 11,000 cubic feet per ton of Coal as per analysis by Mr. John Pattinson, F.C.S., F.I.S.

FOR PRICES AND PARTICULARS, APPLY TO

S. J. DITCHFIELD,
SEAHAM HARBOUR, COUNTY OF DURHAM.

CAST-IRON PIPES
FOR GAS AND WATER.

Pipes, One to Six inch Bore, kept in Stock. Also a very large assortment of all sizes of Bends, T-pieces, and Specials ready for despatch on receipt of Order.

VALVES
FOR GAS, WATER, AND STEAM.

TELEGRAMS: "PIPES GLASGOW."

WM. MACLEOD & CO.,
56, ROBERTSON STREET, GLASGOW.

Awarded HIGHEST MEDAL and DIPLOMA at the Newcastle-on-Tyne Royal Mining and Industrial Exhibition, 1887, for

CANNEL & COAL.

TYNE
BOGHEAD
CANNEL.

Yield of Gas per ton	13,155 cub. ft.
Illuminating Power	38·22 candles.
Coke per ton	1,301·88 lbs.

EAST PONTOP
GAS COAL.

Yield of Gas per ton	10,500 cub. ft.
Illuminating Power	16·3 candles.
Coke	70 per cent.

SOUTH PELAW MAIN
GAS COAL.

Yield of Gas per ton	10,500 cub. ft.
Illuminating Power	16·3 candles.
Coke	73·1 per cent.

For Prices and complete Analysis, apply to

THOS. W. DANCE & SONS,
COAL OWNERS, NEWCASTLE-ON-TYNE;
OR
E. FOSTER & CO.,
21, JOHN STREET, ADELPHI, LONDON, W.C.

TROTTER, HAINES, & CORBETT,

Brettell's Estate

FIRE-CLAY & BRICK WORKS,

STOURBRIDGE.

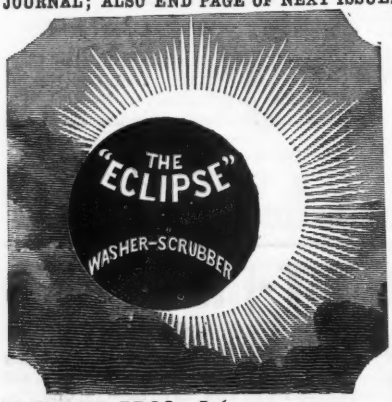
Manufacturers of GAS-RETORTS, GLASSHOUSE FURNACE & BLAST-FURNACE BRICKS, LUMPS, TILES, and every description of FIRE-BRICKS.

Proprietors of

BEST GLASSHOUSE POT & CRUCIBLE CLAY

Shipments Promptly and Carefully Executed.

SEE ADVT., p. 356 OF LAST WEEK'S JOURNAL; ALSO END PAGE OF NEXT ISSUE.



CLAPHAM BROS., Ld., Keighley, Yorks.

THE

AUTOMATIC MACHINERY

for the Magnificent New Retort-House and Coal-Stores at Rochdale will be arranged for

INSPECTION

FROM THE

8th till the 18th of August;

and we cordially invite Gas Engineers and Managers to visit our works at Aberdeen.

NEW CONVEYOR Co.,

LIMITED,

3 & 4, Lime St. Square,

LONDON.

HEBBURN MAIN GAS COALS.

Yield of Gas per ton . . . . . 10,500 cubic feet.
Illuminating Power . . . . . 16·4 candles.
Coke . . . . . 68 per cent.

For prices, f.o.b. Ship or Delivered by Rail, apply to

THE WALLSEND & HEBBURN COAL COMPANY, LTD.

B Lombard Street,
NEWCASTLE-ON-TYNE.

W. RICHARDSON, Fitter.

THE SILICA FIRE-BRICK COMPANY,

OUGHTIBRIDGE, near SHEFFIELD,

MANUFACTURE

SILICA BLOCKS, BRICKS, AND CEMENT

OF SUPERIOR QUALITY

FOR GAS-FURNACES.

Trade Mark: "SILICA."

These Goods (largely used in Gas, Glass, Iron, and Steel Works) are, on account of their

GREATER DURABILITY

Strongly recommended where EXCESSIVE HEATS have to be maintained

THE DRUM

FOR PUMPING AIR, WATER, SEMI-FLUIDS, &c.

See Advertisement in last and next issue.

T. B. KITTEL, SHEFFIELD.

CONTRACTS FOR SUPPLIES OF ANY OF THE PRINCIPAL

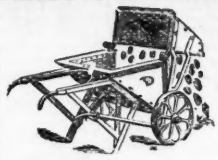
ENGLISH & SCOTCH CANNELS.

REAL SILKSTONE GAS COAL

ANALYSIS AND PRICES ON APPLICATION.

T. B. KITTEL, SHEFFIELD.

PRICE'S PATENT COKE & COAL BARROW



effecting a great saving of time, labour, and expense.

For particulars, price, &c., apply to Mr. E. PRICE, Inventor and Patentee, 22, Alwyne Road, Canonbury, LONDON, N.

Prices are Reduced.

THORNLEY GAS COALS

WORKED BY THE

WEARDALE IRON AND COAL COMPANY, Ld.

OUT OF THEIR

THORNLEY AND WHEATLEY HILL COLLIERIES.

The Analysis made by Messrs. J. and H. T. Pattinson, Public Analysts for Northumberland, gives 10,500 cubic feet of Gas per ton, with an Illuminating Power of 16·3 Candles and 67·3 per cent. of Coke. The following is a Working Analysis made of these Coals by the Tudhoe and Sunderland Bridge Gas Company:—

[COPY.]

TUDHOE AND SUNDERLAND BRIDGE GAS COMPANY.
Tudhoe Gas-Works,
Spennymoor,
8th June, 1893.

Messrs. The

WEARDALE IRON & COAL COMPANY, LTD.

GENTLEMEN,

For the last two months we have used your **THORNLEY GAS COAL** exclusively at these gas-works; and I have pleasure in herewith giving you the actual results obtained during the trial.

Yield of Gas per ton: 10,300 cubic feet.
Yield of Coke: 13½ cwt.

Illuminating Power of Gas, average of a series of tests, **17 Sperm Candles.**

The Coke was of excellent quality.

The following is a complete ultimate Analysis of the Coal.

	PER CENT.
Carbon	83·128
Hydrogen	5·116
Oxygen	7·401
Nitrogen	0·585
Sulphur	0·620
Ash	3·130
Water	0·020
	100·000

Analysis of the Coke.

Carbon	93·31
Sulphur	0·61
Ash	5·00
Moisture	1·08
	100·00

I am, Gentlemen,
Yours truly,
A. B. COWAN,
Manager.

For Price, &c., apply to the

WEARDALE IRON & COAL Co., Ld.

QUAYSIDE, NEWCASTLE-ON-TYNE.

Wrought-Iron

And Fittings and Accessories.

LAMBERT BROS., WALSALL,

MANUFACTURERS OF

WROUGHT-IRON TUBES & FITTINGS for GAS, WATER, & STEAM.

BRASS GAS-FITTINGS GAS-VALVES, STEAM & WATER VALVES TOOLS, &c., AND OF

WARNER'S PATENT MARKET GAS STAND-PIPE.

LONDON: LAMBETH BRASS & IRON CO., Short Street, LAMBETH.

TELEGRAPHIC ADDRESS: "ROBUSTNESS, LONDON."

GASEOUS FIRING

FOR LARGE OR SMALL

RETORT-SETTINGS

PLANS, SPECIFICATIONS, AND ESTIMATES SUBMITTED.

SPECIALTIES

EXCHANGE TELEPHONE 1756.

J. & H. ROBUS,

20, LUCKLERSBURY, LONDON, E.C.

ENGINEERS & CONTRACTORS

FOR THE ERECTION OF GAS AND WATER WORKS COMPLETE, AND FOR EXTENSIONS AND RENEWALS.

The most Important Improvement yet made in Gas-Fires.

Patented in the United Kingdom and Abroad.

THE "MAIN"

NEWLY PATENTED

GAS-FIRE BURNER

ABSOLUTELY PREVENTS FIRING BACK.

See description in JOURNAL OF GAS LIGHTING, Aug. 14, 1894.

ABOLISHES HISSING NOISE.

Can be fitted with perfect safety to small supply, or where there is a weak pressure.

Full particulars will be announced in an early issue.

R. & A. MAIN,

GAS ENGINEERS,

ARGYLE WORKS, KINNING PARK, GLASGOW,

11, CARTHUSIAN STREET (CHARTERHOUSE SQ.), LONDON, E.C.

Telegrams: "GASMAIN, GLASGOW;" "GASMAIN, LONDON."

"CANNELINE"

FOR ENRICHING COAL GAS.

Superior to the very Volatile Hydrocarbons; requiring only a simple apparatus, at quite a nominal cost.

Coal Gas can be enriched by "CANNELINE," in our specially designed plant, at a cost of ¾d. per Candle, showing conclusively its vast superiority over all other Enriching Agents, including Cannel Coal.

For all particulars, apply to

S. BOWLEY & SON, Wellington Works, BATTERSEA BRIDGE, LONDON.

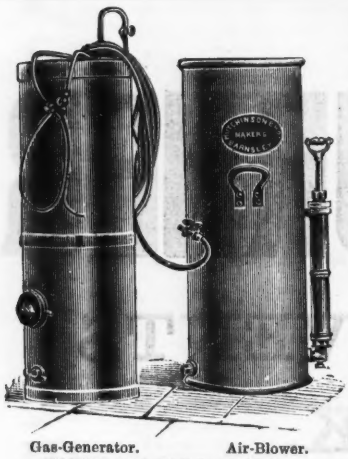
JOHN BROWN & CO., LTD., SHEFFIELD,

Proprietors of

ALDWARKE MAIN CAR HOUSE & ROTHERHAM MAIN COLLIERIES, NEAR ROTHERHAM.

ALDWARKE MAIN GAS COAL

Analysis: 12,600 feet of 19-candle gas per ton.
Weight of illuminating power in pounds of sperm, 820·80. Very free from impurities.
Telegrams: "ATLAS SHEFFIELD."



Gas-Generator. Air-Blower.
IMPROVED LEAD-BURNING APPARATUS.

HUTCHINSON BROS.,

GAS ENGINEERS, &c.

SPECIALITY.

LEAD WORK FOR SULPHATE OF AMMONIA PLANTS,

BEST QUALITY OF MATERIAL AND WORKMANSHIP.

SATURATORS, all Lead, or Strong Sheet Lead, in Wood Casing,

ACID TANKS, ELEVATORS, AND COCKS. LIQUOR AND LIME PUMPS OR INJECTORS.

Liquor-Cocks, Gauge Fittings, and Safety-Valves in Cast Iron.
HYDROMETERS, TEST-JARS (GLASS OR LEAD), COPPER SCOOPS, &c., &c.

IMPROVED LEAD-BURNING APPARATUS.

LEAD BURNERS SENT OUT TO REPAIRS.

FALCON WORKS, BARNSLEY.

Telegrams: "HUTCHINSON BROS., BARNSLEY."

THE WHESSOE FOUNDRY CO., LTD., DARLINGTON.

Established 1790.

MANUFACTURERS OF EVERY DESCRIPTION OF GAS PLANT,

FROM

RETORTS

TO

GASHOLDERS,

FOR WHICH THEY HAVE THE NEWEST AND MOST MODERN MACHINERY.

GASHOLDERS CAN BE MADE OF ANY DIAMETER AND PUT TOGETHER AT THE WORKS.

Holders having a capacity of **8,000,000** Cubic Feet have been made and erected; the largest one being 181 feet diameter by 136 feet 9 inches deep. Riveted entirely with ⅞-inch diameter Hot Rivets.

WE ERECT GASHOLDERS EITHER WITH OR WITHOUT FRAMING.

NO ROYALTIES TO PAY FOR PATENTS.

SOLE MAKERS OF

COATES' IMPROVED PATENT FURNACE DOOR PROTECTOR

Which has been approved and adopted by the Gas Authorities at

SALFORD, MANCHESTER, BIRKENHEAD, STOCKTON, NEWCASTLE, DARLINGTON, &c.

Telegraphic Addresses: "WHESSOE, DARLINGTON." "WHESSOE, LONDON." | **T. COATES,** MANAGING DIRECTOR. | WORKS: DARLINGTON. LONDON OFFICE: 28, QUEEN STREET, E.C.

WEST'S GAS IMPROVEMENT COMPANY, LTD.,

ALBION IRON-WORKS, MILES PLATTING, MANCHESTER.

AND

104, Queen Victoria St.,

LONDON, E.C.

WEST'S

MANUAL

AND

POWER

MACHINERY

FOR

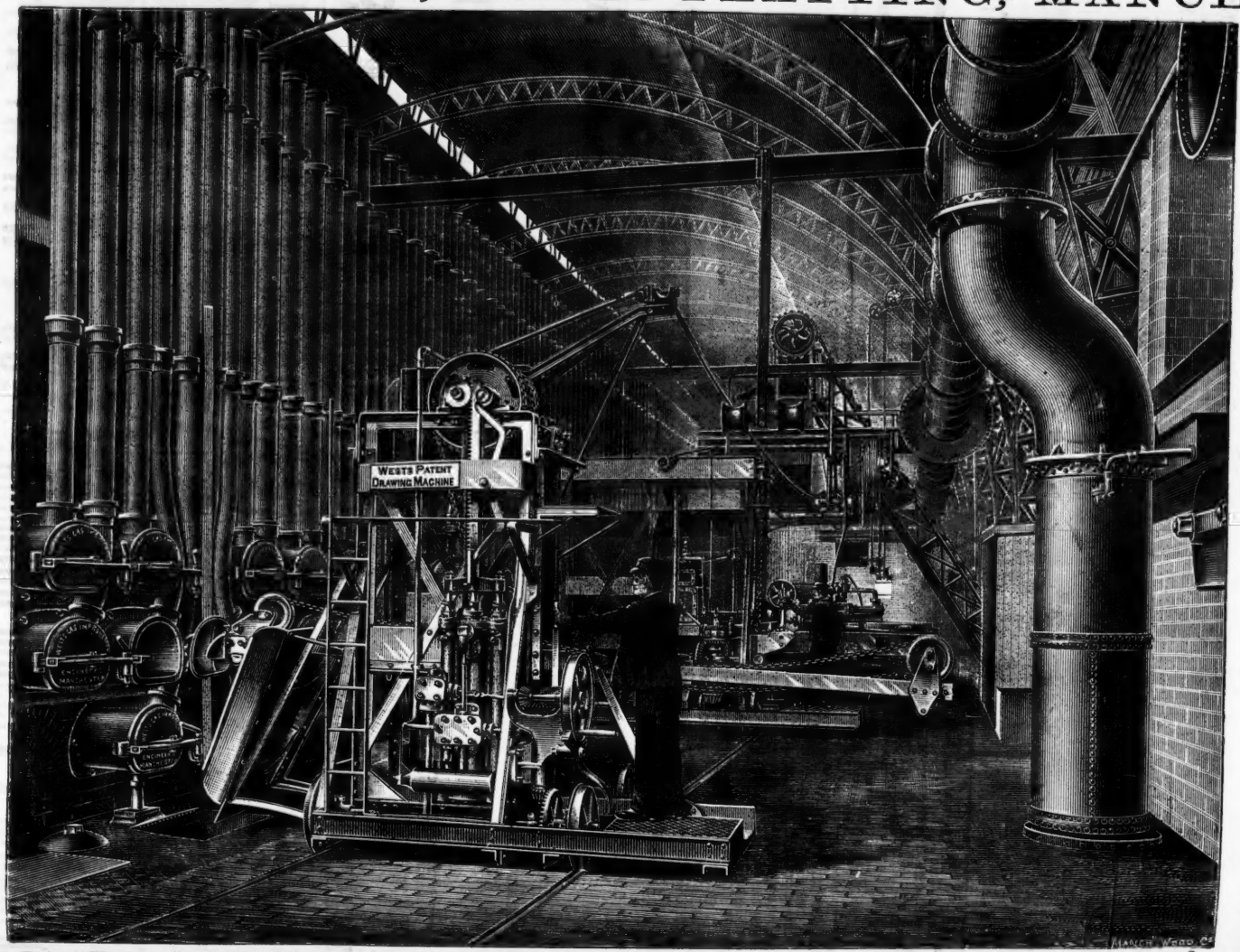
CHARGING

AND

DRAWING

GAS-

RETORTS.



Interior of Retort-House at the Bradford Road Gas-Works, Manchester, showing the Compressed-Air Drawing and Charging Machines.

AND

104, Queen Victoria St.,

LONDON, E.C.

OVER

560,000

LINEAL

FEET

OF

RETORTS

DAILY

ARE CHARGED

AND DRAWN BY

WEST'S

MACHINES.

GAS AND WATER PIPES.

Telegraphic Address: "RITCHIE MIDDLESBROUGH."

WILLIAM INGHAM & SONS,

Incorporated with the Leeds Fire-Clay Company, Ltd.,

WORTLEY FIRE-CLAY WORKS,

Near LEEDS,

Have confidence in drawing the special attention of GAS ENGINEERS to the following advantages of their Retorts:—

1. Smooth interior, preventing adhesion of Carbon.
2. They can be made in one piece up to 10 feet long.
3. Uniformity in thickness, ensuring equal Expansion and Contraction.

PATENT

MACHINE-MADE GAS-RETORTS.

GAS AND WATER PIPES

AND

CASTINGS OF EVERY DESCRIPTION.

MANUFACTURED BY THE

CLAY CROSS COMPANY,

CHESTERFIELD.

TRADE	TELEGRAMS:	LONDON AGENTS:
CXC	"JACKSON"	BECK & Co.,
MARK.	CLAY CROSS.	130, GT. SUFFOLK ST., S.E.

GODDARD, MASSEY, & WARNER'S

IMPROVED

Sulphate of Ammonia Apparatus.

The most successful and approved Apparatus known up to the present time.

FOR REFERENCES, PARTICULARS, TESTIMONIALS, AND PRICE APPLY TO

GODDARD, MASSEY, & WARNER,

ENGINEERS,

NOTTINGHAM.

The Apparatus has been supplied to the following Firms—

BURT BOULTON, & HAYWOOD, SILVERTOWN, and ELING.
CHANCE BROTHERS, OLDBURY (Four Apparatus).
RUNCORN SOAP & ALKALI CO., Limited, RUNCORN.
NETHAM CHEMICAL CO., Limited, BRISTOL.
ANIMAL CHARCOAL CO., Limited, SHADWELL.
WM. BUTLER & CO., BRISTOL.
KEMPSON & CO., Pye Bridge.

And to the following Gas Companies and Corporations—

ILKESTON.	BURY.	CHORLEY.
WIDNES.	BRIGHOUSE.	WHITEHAVEN.
HALIFAX.	MARKET HARBRO'.	CHESTER.
ALTRINCHAM.	PRESCOT.	SOUTH SHIELDS.
DENTON.	SOWERBY BRIDGE.	LEEK.
ST. ALBANS.	LEICESTER.	IPSWICH.
DUKINFIELD.	DARWEN.	BOURNEMOUTH.
NORTHWICH.	NELSON.	SALFORD.
HUDDERSFIELD.	ORMSKIRK.	LUTON.
		HAMPTON COURT.

JONAS DRAKE & SON,

LONDON OFFICE:
60, QUEEN VICTORIA ST., E.C.

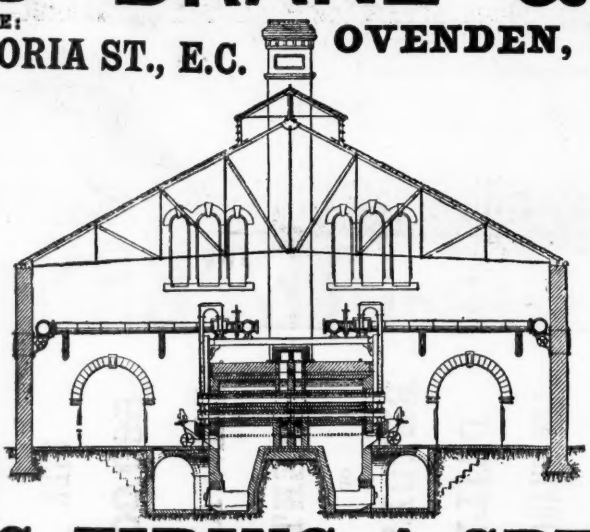
OVENDEN, HALIFAX.

TELEGRAPHIC ADDRESSES
"DRAKESON, HALIFAX."
"ECLAIRAGE, LONDON."

TELEPHONE No. 43.
HALIFAX EXCHANGE.

GAS ENGINEERS,
CONTRACTORS,
IRONFOUNDERS,

BUILDERS AND ERECTORS OF EVERY DESCRIPTION OF OVENS, BENCHES, KILNS, FURNACES, &c.



RETORT SETTERS,
FURNACE BUILDERS
ETC., ETC.

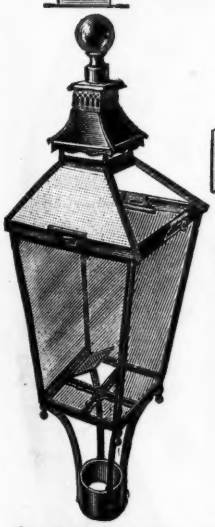
EGENERATOR AND GENERATOR FURNACES ON DRAKE'S, FRITH'S, SIEMENS'S, KLONNE'S, HASSE'S, VALON'S, SOMERVILLE'S, PONSARD'S and other Principles.

INCLINED RETORTS

GASEOUS FIRING A SPECIALTY.

RETORT SETTING IN ALL ITS PRINCIPLES AND BRANCHES. BENCHES FITTED UP COMPLETE.
DRAWINGS SPECIFICATIONS AND ALL OTHER PARTICULARS ON APPLICATION.

Gas Lamps and Posts.



Patent Street Lamps.

NO PUTTY.

Several thousands of these are now in use, giving general satisfaction. They are strongly made, and of best material.

Lamplighters' Torches.

Lever Taps.

Lamp Governors.

PRICE LIST ON APPLICATION.

SPECIAL HIGH-POWER LAMPS.

For Lighting Streets, Refuges, Promenades, &c., where a good light is required. Fitted with Porcelain cone, Copper top and perforation, Wrought-Iron Spray, Lever Tap, Burner and Patent Governor, glazed with Opal top.

GAS-METERS.

PREPAYMENT METERS

(PRICE'S PATENT)

SPECIALLY ADAPTED FOR INCREASING CONSUMPTION AMONG SMALL CONSUMERS. NO RISK OF BAD DEBTS.

D. HULETT & Co., Ltd.,

55 & 56, HIGH HOLBORN, LONDON.

HEATHCOTE GAS COAL.

RICH IN ILLUMINATING POWER AND YIELD OF GAS.
ABOVE THE AVERAGE IN WEIGHT AND QUALITY OF COKE.
MAINTAINS A HIGH STANDARD IN RESIDUALS.

THE GRASSMOOR Co., Ld., CHESTERFIELD.

CLAYTON SON & Co. LTD

MAKERS OF

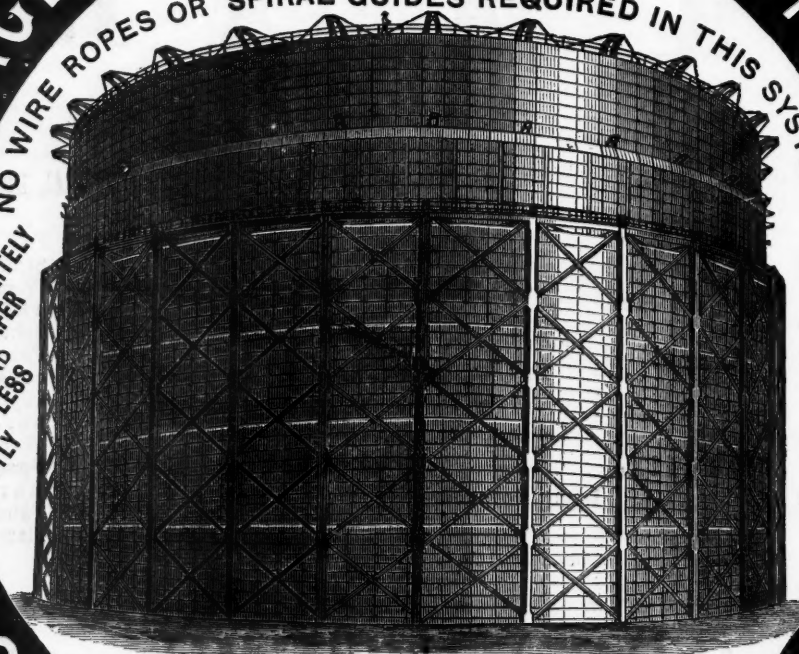
WORKS LEEDS

THE LARGEST GASHOLDER IN THE WORLD. CAPACITY 12 MILLION CUBIC FT.

GASHOLDERS OUR SPECIALITY

NO WIRE ROPES OR SPIRAL GUIDES REQUIRED IN THIS SYSTEM.

INFINITELY SAFER AND FAR LESS COSTLY THAN ROPES OR SPIRAL GUIDES.



ERECTED AT EAST GREENWICH FOR THE South Metropolitan Gas Company
IT HAS SIX LIFTS 30 FT. DEEP EACH AND IS 300 FT. DIAR.

MAKERS OF GAS PLANT OF EVERY DESCRIPTION

ROOFS PURIFIERS &c. ALSO

ADDRESS LONDON 60, QUEEN VICTORIA ST. TELEGRAPHIC "GAS, LEEDS.

GASHOLDERS OF ANY SIZE

ERECTED & COMPLETED WITHIN 12 MONTHS AND AT THE TIME SPECIFIED

ALEX. C. HUMPHREYS, M.E. A. G. GLASGOW, M.E.
TELEGRAPHIC ADDRESS:
"EPISTOLARY, LONDON."

HUMPHREYS & GLASGOW,

Contracting Engineers for

CARBURETTED WATER GAS PLANT,

9, Victoria Street, London, S.W.

Price 21s., Post Free,

PRECEDENTS IN PRIVATE BILL LEGISLATION

AFFECTING GAS AND WATER UNDERTAKINGS, 1879-90.

Compiled by E. H. STEVENSON & E. K. BURSTAL.

LONDON: WALTER KING, 11, BOLT COURT, FLEET ST., E.C.

HARPER & MOORES,

STOURBRIDGE.

MANUFACTURERS OF

BEST FIRE-BRICKS, GAS-RETORTS,

LUMPS, TILES, AND ALL ARTICLES IN FIRE-CLAY.

Proprietors of Best Glasshouse Pot, Crucible, and other Stourbridge Clays.

MANUFACTURERS OF GLASSHOUSE POTS AND CRUCIBLES OF EVERY KIND.

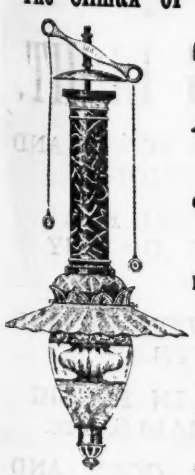
ESTABLISHED 1836.

OSLER,

BIRMINGHAM.

MANUFACTURERS OF GASELIERS IN GLASS AND METAL.

The Climax of Regenerative Gas Lighting!!



THE

"VERTMARCHE"

A 280-CANDLE POWER PLAIN IRON LAMP,

CLASS A— **55/-**

LIGHT for LIGHT less than half the price of any other Regenerative Lamp.

Manufactured in England.

HENRY GREENE & SONS,

153 & 155, CANNON STREET, LONDON BRIDGE, E.C.

PARTICULARS AND PRICES FREE. AGENTS WANTED.

STOURBRIDGE RETORTS AND FIRE-BRICKS.

BEST QUALITY.

KING BROTHERS, STOURBRIDGE.

[See Illustrated Advertisement, Aug. 7, p. 299.]

CROWTHER BROTHERS,

Contractors for the Erection of Gas-Works Complete, RETORT-SETTINGS, Furnace Building, the Erection of Retort-Benches, &c., &c.

N.B.—Special attention given to the Erection of Inclined Retort-Benches on the Generator and Regenerative Principles complete.

MAIN LAYING IN ALL ITS BRANCHES.

For Terms and Particulars, apply to

CROWTHER BROTHERS,

152, Teviot Street, St. Leonard's Road,

POPLAR, LONDON, E.

Telegraphic Address: "GASRETORT, LONDON."

Experienced Retort Setters and Main Layers sent to all Parts on the Shortest Notice.

ARROL-FOULIS

Patent Automatic Machinery

FOR

DRAWING AND CHARGING GAS-RETORTS.

Full Particulars may be obtained from the Sole Makers,

SIR WILLIAM ARROL & CO., Limited,

GLASGOW.

See Illustrated Advertisement, p. II. Centre of JOURNAL for Aug. 14.

R. DEMPSTER & SONS, LTD.

Every Description of Gas Apparatus.

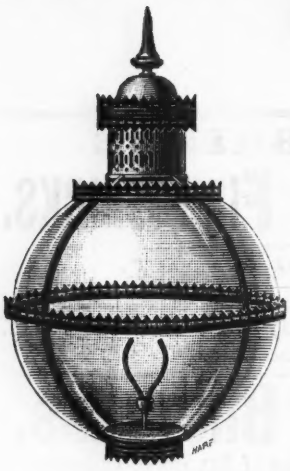
ELLAND, YORKS.

W. PARKINSON & CO.

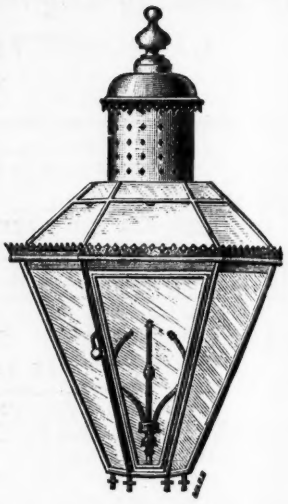
MANUFACTURERS OF

Improved Lamps for Street Lighting

IN EVERY SIZE AND STYLE.



STREET LAMP METERS.
LAMP COCKS.



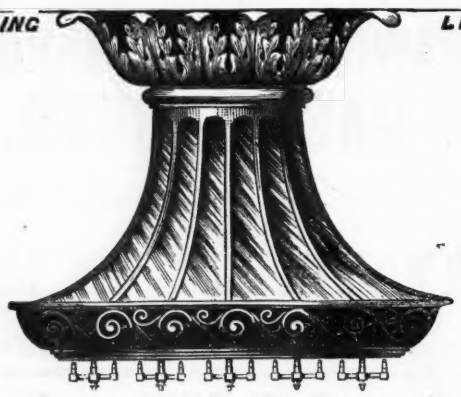
LAMPLIGHTERS' TORCHES.

Our long experience in all branches of work connected with Street Lighting enables us to supply goods of the most improved construction, and of the highest quality.

PATTERN SHEET AND REFERENCES SENT ON APPLICATION.

ALSO SOLE MAKERS OF

HUNT'S PATENT
SUN-BURNER OR VENTILATING CEILING LIGHT.



HIGHEST ILLUMINATING POWER AND PERFECT VENTILATION.

ESTIMATES SUBMITTED FOR LIGHTING BUILDINGS OF ANY DIMENSIONS.

VENTILATING FLUES SUPPLIED AND FIXED COMPLETE.

EXTENSIVELY IN USE IN PUBLIC OFFICES, CHURCHES, HALLS, ETC.

ECONOMICAL IN FIRST COST AND VERY DURABLE.

MADE IN VARIOUS SIZES. **TESTIMONIALS ON APPLICATION.**

COTTAGE LANE WORKS, CITY ROAD,
LONDON.
Telegraphic Address: "INDEX."

BELL BARN ROAD WORKS,
BIRMINGHAM.
Telegraphic Address: "GAS-METERS."

OFFICE: 10, MAWSON'S CHAMBERS, DEANSGATE,
MANCHESTER.
Telegraphic Address: "PRECISION."

[See also Advt. p. 364.

LONDON: Printed by WALTER KING (at the Office of King, Sell, and Railton, Ltd., 12, Gough Square); and published by him at 11, Bolt Court, Fleet Street, in the City of London.—Tuesday, Aug. 21, 1894.